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Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) —

Part 13: "Mass" information for jurisdictional control and enforcement

Systèmes intelligents de transport — Cadre pour applications télématiques coopératives pour véhicules de fret commercial réglementé (TARV)

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

ISO 15638 consists of the following parts, under the general title *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV)*:

— *Part 1: Framework and architecture*

— *Part 2: Common platform parameters using CALM*

— *Part 3: Operating requirements, 'Approval Authority' procedures, and enforcement provisions for the providers of regulated services*

— *Part 5: Generic vehicle information*

— *Part 6: Regulated applications*

— *Part 7: Other applications*

— *Part 8: Vehicle access management*

— *Part 9: Remote electronic tachograph monitoring (RTM)*

— *Part 10: Emergency messaging system/eCall (EMS)*

— *Part 11: Driver work records*

— *Part 12: Vehicle mass monitoring*

— *Part 13: 'Mass' information for jurisdictional control and enforcement*

— *Part 14: Vehicle access control*

— *Part 15: Vehicle location monitoring*

— *Part 16: Vehicle speed monitoring*

— *Part 17: Consignment and location monitoring*

— *Part 18: ADR (Dangerous Goods) transport monitoring (ADR)*

— *Part 19: Vehicle parking facilities (VPF)*

The following parts are under preparation:

— *Part 4: System security requirements*

Introduction

Many ITS technologies have been embraced by commercial transport *operators* (4.39) and freight owners, in the areas of fleet management, safety and security. *Telematics* (4.52) applications have also been developed for governmental use. Such regulatory services in use or being considered vary from *jurisdiction* (4.34) to *jurisdiction*, but include electronic on-board recorders, digital *tachograph* (4.51), on-board *mass* (4.37) monitoring, *Mass* (4.37) information for jurisdictional control and enforcement, vehicle *access* (4.1) *methods*, *hazardous goods* (4.29) tracking and e-call (4.25). Additional applications with a regulatory impact being developed include fatigue management, speed monitoring and heavy vehicle penalties imposed based on location, distance and time.

In such an emerging environment of regulatory and *commercial applications* (4.16), it is timely to consider an overall *architecture* (4.12) (business and functional) that could support these functions from a single platform within a commercial freight vehicle that operates within such regulations. International Standards will allow for a speedy development and *specification* (4.50) of new applications that build upon the functionality of a generic specification platform. A suite of standards deliverables is required to describe and define the *framework* (4.28) and requirements so that the on-board equipment and back office systems can be commercially designed in an open market to meet common requirements of *jurisdictions* (4.34).

This suite of standards addresses and defines the *framework* (4.28) for a range of cooperative *telematics* (4.52) applications for *regulated vehicles* (4.43) (such as *access methods* (4.3), driver *f*atigue management, speed monitoring, on-board *mass* (4.37) monitoring, penalties and enforcement). The overall scope includes the concept of operation, legal and regulatory issues, and the generic cooperative provision of services to *regulated vehicles* (4.43), using an on-board ITS platform. The *framework* is based on a (multiple) *service provider* (4.48) oriented approach with provisions for the *approval* (4.9) and *auditing* (4.13) of *service providers*.

This suite of standards deliverables will

— provide the basis for future development of cooperative *telematics* (4.52) applications for *regulated vehicles* (4.43). Many elements to accomplish this are already available. Existing relevant standards will be referenced, and the *specifications* (4.50) will use existing standards (such as *CALM*) wherever practicable;

— allow for a powerful platform for highly cost-effective delivery of a range of *telematics* applications for *regulated vehicles* (4.43),

— a business *architecture* (4.12) based on a (multiple) *service provider* (4.48) oriented approach, and

— address legal and regulatory aspects for the *approval* (4.9) and *auditing* (4.13) of *service providers.*

This suite of standards deliverables is timely as many governments (Europe, North America, Asia and Australia/New Zealand) are considering the use of *telematics* (4.52) for a range of regulatory purposes. Ensuring that a single in-vehicle platform can deliver a range of services to both government and industry through open standards and competitive markets is a strategic objective.

This part of ISO 15638 provides *specifications* (4.50) for *Mass* (4.37) information for jurisdictional control and enforcement.

NOTE 1 The definition of what comprises a 'regulated' vehicle is regarded as an issue for National decision, and may vary from *jurisdiction* (4.36) to *jurisdiction*. This suite of standards deliverables does not impose any requirements on nations in respect of how they define a *regulated vehicle* (4.43).

NOTE 2 The definition of what comprises a 'regulated' service is regarded as an issue for National decision, and may vary from *jurisdiction* (4.34) to *jurisdiction*. This suite of standards deliverables does not impose any requirements on nations in respect of which services for *regulated vehicles* (4.43) *jurisdictions* will require, or support as an option, but will provide standardised sets of requirements descriptions for identified services to enable consistent and cost-efficient implementations where implemented.

Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) —

Part 13: "Mass" information for jurisdictional control and enforcement

1 Scope

This part of ISO 15638 addresses the provision of *'Mass* (4.37) *information for jurisdictional control and enforcement'* and specifies the form and content of such data required to support such systems and *access methods* (4.3) to that data.

The Scope of this part of ISO 15638 is to provide *specifications* (4.50) for common communications and data exchange aspects of the *application service* (4.6) *Mass* (4.37) information for jurisdictional control and enforcement that a *regulator* (4.44) may elect to require or support as an option, including

a) high-level definition of the service that a *service provider* (4.48) has to provide (the service definition describes common service elements but does not define the detail of how such an *application service* (4.6) is instantiated, not the acceptable value ranges of the data concepts defined),

b) means to realize the service, and

c) application data, naming content and quality that an *IVS* (4.30) has to deliver.

For clarification, *Mass* in this context is defined as a mass of a given heavy vehicle as measured by equipment affixed to the regulated vehicle; these mass calculations are achieved by dynamic real-time measurement using equipment especially installed for this purpose to measure the 'mass' impact on the road surface; it is, by definition, a service that can only be available to regulated vehicles that are especially equipped" (4.37).

The definition of what comprises a 'regulated' service is regarded as an issue for National decision, and may vary from *jurisdiction* (4.34) to *jurisdiction*. This deliverable does not impose any requirements on nations in respect of which services for *regulated vehicles jurisdictions* will require, or support as an option, but provides standardised sets of requirements descriptions for identified services to enable consistent and cost-efficient implementations where instantiated.

This part of ISO 15638 is not a substitute for general electronic fee collection system which, where applied normally need to accord to International EFC Standards in preference to this specification. The Scope of this part of ISO 15638 is limited to the imposition of control and enforcement measures for regulated commercial freight vehicles related to measurement of the *Mass* (4.37) on board the vehicle.

ISO 15638 has been developed for use in the context of regulated commercial freight vehicles [hereinafter, referred to as 'regulated vehicles' (4.43)]. There is nothing however to prevent a jurisdiction extending or adapting the scope to include other types of regulated vehicles, as it deems appropriate.

2 Conformance

Requirements to demonstrate conformance to any of the general provisions or specific *application services* (4.6) described in this part of ISO 15638 shall be within the regulations imposed by the *jurisdiction* (4.34) where they are instantiated. Conformance requirements to meet the provisions of

this International Standard are therefore deemed to be under the control of, and to the specification of, the *jurisdiction* where the *application service*(s) is/are instantiated.

The protocols defined in this part of ISO 15638 have been independently tested. Annex B provides results of these tests. In any conformance assurance process undertaken by candidate systems, where appropriate, the results may be used as part of its process of conformance compliance.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12855, *Electronic fee collection — Information exchange between service provision and toll charging*

ISO 15638-1, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 1: Framework and architecture*

ISO 15638-2, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 2: Common platform parameters using CALM*

ISO 15638-3, *Intelligent transport systems — Framework for collaborative telematics applications for regulated commercial freight vehicles (TARV) — Part 3: Operating requirements, 'Approval Authority' procedures, and enforcement provisions for the providers of regulated services*

ISO 15638-4:—[1)], *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV)* — Part 4: System security requirements

ISO 15638-5, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 5: Generic vehicle information*

ISO 15638-6, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 6: Regulated applications*

ISO 15638-12, *Intelligent transport systems — Framework for cooperative telematics applications for regulated vehicles (TARV) — Vehicle mass monitoring*

ISO 15638-14, *Intelligent transport systems — Framework for cooperative telematics applications for regulated vehicles (TARV) — Vehicle access control*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15638-1 and the following apply.

4.1
access
admittance, entry, permit to use the road network and/or associated infrastructure (bridges, tunnels, etc.)

4.2
access control
procedures and measures to control admittance, entry, permit to use the road network and/or associated infrastructure (bridges, tunnels, etc.)

4.3
access methods
procedures and protocols to provision and retrieve data

1) Under development.

4.4
access monitoring
observation and recording of vehicle-related data when using the road network and/or associated infrastructure (bridges, tunnels, etc.)

4.5
app
small (usually) *Java™* (4.33) applets, organised as software bundles, that support *application services* (4.6) by keeping the *data pantry* (4.22) provisioned with up-to-date data

4.6
application service
service provided by a *service provider* (4.48) enabled by accessing data from the *IVS* (4.30) or a *regulated vehicle* (4.43) via a wireless communications network

4.7
application service provider
ASP
party that provides an *application service* (4.6)

4.8
app library
separately secure area of memory in *IVS* (4.30) where apps are stored (with different access controls to *data pantry* (4.22))

4.9
approval
formal affirmation that an applicant has satisfied all the requirements for appointment as an *application service provider* (4.7) or that an application service delivers the required service levels

4.10
approval agreement
written agreement made between an *approval authority (regulatory)* (4.11) and a *service provider* (4.48)

Note 1 to entry: An app*roval authority (regulatory)* (4.11) approval agreement recognizes the fact that a *service provider* (4.48), having satisfied the *approval authority's* requirements for appointment as a *service provider,* is appointed in that capacity and sets out the legal obligations of the parties with respect to the on-going role of the *service provider*.

4.11
approval authority (regulatory)
organisation (usually independent) which conducts *approval* (4.9) and ongoing *audit* (4.13) for *service providers* (4.48) on behalf of a *jurisdiction* (4.34)

4.12
architecture
formalised description of the design of the structure of *TARV* and its *framework* (4.28)

4.13
audit/auditing
review of a party's capacity to meet, or continue to meet, the initial and ongoing *approval agreements* (4.10) as a *service provider* (4.48)

4.14
basic vehicle data
data that shall be maintained/provided by all *IVS* (4.30) (regardless of *jurisdiction* (4.34))

4.15
communications access for land mobiles
CALM
layered solution that enables continuous or quasi-continuous communications between vehicles and the infrastructure, or between vehicles, using such (multiple) wireless telecommunications media that are available in any particular location, and which have the ability to migrate to a different available media where required and where media selection is at the discretion of *user* (4.53) determined parameters by using a suite of standards based on ISO 21217 and ISO 21210 that provide a common platform for a number of standardised media using *ITS-stations* (4.32) to provide wireless support for applications, such that the application is independent of any particular wireless medium

4.16
commercial application(s)
ITS applications in *regulated vehicles* (4.43) for commercial (non-regulated) purposes

EXAMPLE Asset tracking, vehicle and engine monitoring, cargo security, driver management, etc.

4.17
consignment
shipment of goods/cargo to a destination

4.18
controlled zone/controlled access zone
defined physical area which the *jurisdiction* (4.34) or *controlled zone* manager determines require *access control* (4.2) for *regulated vehicles*

4.19
cooperative ITS
C-ITS
ITS applications for both regulatory and commercial purposes that require the exchange of data between uncontracted parties using multiple *ITS-stations* (4.32) communicating with each other and sharing data with other parties with whom they have no direct contractual relationship to provide one or more *ITS services* (4.31)

4.20
core data
basic vehicle data (4.14) plus any additional data required to provide an implemented *regulated application service* (4.42)

4.21
dangerous goods
substances or articles which are potentially hazardous (for example, poisonous to humans, harmful to the environment, explosive, flammable or radioactive) that require regulatory control when transported

4.22
data pantry
secure area of memory in *IVS* (4.30) where data values are stored (with different access controls to *app library* (4.8))

4.23
driver
person driving the *regulated vehicle* at any specific point in time

4.24
driver work records
DWR
collection, collation, and transfer of *driver* (4.23) work and rest hours data from an *in-vehicle system* (4.30) to an *application service provider* (4.7)

4.25
eCall
specialised instantiation of an *EMS* (4.26) that provides incident messaging and communication with a public service assistance point via priority wireless telephone communications using its emergency call capabilities

4.26
emergency message system
EMS
collection, collation, and transfer of emergency message data from an *in-vehicle system* (4.30) to an *application service provider* (4.7)

4.27
facilities
layer that sits on top of the communication stack and helps to provide data interoperability and reuse and to manage applications and enable dynamic real-time loading of new applications

4.28
framework
particular set of beliefs, ideas referred to in order to describe a scenario or solve a problem

4.29
hazardous goods/HAZMAT
see *dangerous goods* (4.31)/*Accord européen relatif au transport international des marchandises Dangereuses par Route (ADR)* (4.5)

4.30
in-vehicle system
IVS
ITS-station (4.32) and connected equipment on board a vehicle

4.31
ITS service
communication functionality offered by an *ITS-station* (4.32) to an *ITS-station* application

4.32
ITS-station
ITS-s
entity in a communication network, comprised of application, *facilities* (4.28), networking and access layer components specified in ISO 21217 that operate within a bounded secure management domain

4.33
Java™
object-oriented open-source operating language developed by SUN systems

4.34
jurisdiction
government, road or traffic authority which owns the r*egulatory applications* (4.42)

EXAMPLE Country, state, city council, road authority, government department (customs, treasury, transport), etc.

4.35
jurisdiction regulator
agent of the *jurisdiction* (4.35) appointed to regulate and manage *TARV* within the domain of the *jurisdiction*; may or may not be the *approval authority (regulatory)* (4.12)

4.36
local data tree
LDT
frequently updated data concept stored in the on-board *data pantry* (4.23) containing a collection of data values deemed essential for either a) *TARV regulated application service* (4.43) or b) *cooperative intelligent transport systems* (4.20)

4.37
mass
mass of a given heavy vehicle as measured by equipment affixed to the *regulated vehicle* (4.43); these mass calculations are achieved by dynamic real-time measurement using equipment especially installed for this purpose to measure the 'mass' impact on the road surface; it is, by definition, a service that can only be available to regulated vehicles that are especially equipped

4.38
mass information for jurisdictional control and enforcement
MICE
collection, collation, and transfer of vehicle *mass* (4.37) data from an *in-vehicle system* (4.30) to an *application service provider* (4.7) to enable, or as part of a system of, imposing control and enforcement measures for *access* (4.1) to/use of specific roads/gates/bridges/tunnels/gates etc. based on the *mass* of the *regulated vehicle* (4.43)

Note 1 to entry: This application should not be confused with weight/volume/distance charging schemes (which are specified in other International Standards).

4.39
operator
fleet manager of a *regulated vehicle*

4.40
prime service provider
service provider (4.48) who is the first contractor to provide *regulated application services* (4.42) to the *regulated vehicle* (4.43), or a nominated successor on termination of that initial contract

Note 1 to entry: The *prime service provider* (4.40) is also responsible to maintain the installed *IVS* (4.30).

Note 2 to entry: If the *IVS* was not installed during the manufacture of the vehicle the *prime service provider* (4.40) is also responsible to install and commission the *IVS* (4.30).

4.41
regulated/regulatory application
application arrangement using TARV utilised by *jurisdictions* (4.34) for granting certain categories of commercial vehicles rights to operate in regulated circumstances subject to certain conditions, or indeed to permit a vehicle to operate within the *jurisdiction*

Note 1 to entry: May be mandatory or voluntary at the discretion of the *jurisdiction*.

4.42
regulated application service
TARV application service to meet the requirements of a regulated application that is mandated by a regulation imposed by a *jurisdiction* (4.34), or is an option supported by a *jurisdiction*

4.43
regulated vehicle
vehicle that is subject to regulations determined by the *jurisdiction* (4.34) as to its use on the road system of the *jurisdiction* in regulated circumstances, subject to certain conditions, and in compliance with specific regulations for that class of regulated vehicle

Note 1 to entry: At the option of *jurisdictions*; This may require the provision of information via *TARV* or provide the option to do so.

4.44
regulator
see *jurisdiction regulator* (4.35)

4.45
remote tachograph monitoring
RTM
collection, collation, and transfer of data from an on-board electronic *tachograph* (4.51) system to an *application service provider* (4.7)

4.46
sensitive/restricted zone
defined physical area which the *jurisdiction* (4.34) or sensitive/restricted zone manager determines require special monitoring (e.g. urban pedestrian areas, school and hospital surroundings, etc.), freight villages, ports, road sensitivity infrastructure (bridges, tunnels, etc.) weight restricted areas, width restricted areas, areas where there have been an accident or incident, etc.

4.47
sensitive/restricted zone management
monitoring and management of *regulated vehicle*s in addition to normal traffic management, as specified by the *jurisdiction* (4.34) or its agents to apply to *regulated vehicles*

4.48
service provider
party which is approved by an approval *authority (regulatory)* (4.11) as suitable to provide regulated or commercial ITS *application services* (4.6)

4.49
session
wireless communication exchange between the *ITS-station* (4.32) of an *IVS* (4.30) and the *ITS-station* of its *application service provider* (4.7) to achieve data update, data provision, upload apps, or otherwise manage the provision of the *application service* (4.6), or a wireless communication provision of data to the *ITS-station* of an *IVS* (4.30) from any other *ITS-station*

4.50
specification
explicit and detailed description of the nature and functional requirements and minimum performance of equipment, service or a combination of both

4.51
tachograph
sender unit mounted to a vehicle gearbox, a tachograph head and a digital driver card, which records the *regulated vehicle* (4.43) speed and the times at which it was driven and aspects of the *driver's* (4.23) activity selected from a choice of modes

4.52
telematics
use of wireless media to obtain and transmit (data) from a distant source

4.53
user
individual or party that enrols in and operates within a regulated or *commercial application* (4.16) *service* (4.6)

EXAMPLE *Driver* (4.23), transport *operator* (4.39), freight owner, etc.

4.54
vehicle access control
VAC
control of *regulated vehicle*s ingress to and egress from controlled areas and associated penalties and levies

4.55
vehicle access management
VAM
monitoring and management of *regulated vehicles* approaching or within sensitive and controlled areas

4.56
vehicle location monitoring
VLM
collection, collation, and transfer of vehicle location data from an *in-vehicle system* (4.30) to an *application service provider* (4.7)

4.57
vehicle mass monitoring
VMM
collection, collation, and transfer of vehicle *mass* (4.37) data from an *in-vehicle system* (4.30) to an *application service provider* (4.7)

5 Symbols and abbreviated terms

AA	*approval authority* (*regulatory*; 4.11)
ADR	*Accord européen relatif au transport international des marchandises Dangereuses par Route* (4.5) [*dangerous goods* (4.21)]
App	applet (JAVA™ application or similar; 4.5)
AS	application service
ASP	*application service provider* (4.7)
CALM	*communications access for land mobiles* (4.15)
CAN	*controller area network* (4.19)
C-ITS	*cooperative intelligent transport systems* (4.19)
CTP	*control test process*
Dr	*driver* (4.23)
DWR	*driver work records* (4.24)
EDGE	enhanced data rate GSM evolution
EMS	*emergency message system* (4.26)
GCM	gross combination *mass* (4.37)
GPRS	global packet radio system
GSM	global system mobiles
ID	Identity
IP	internet protocol
ITS-S	*ITS station* (4.32)
IVS	*In-vehicle system* (4.30)

J	*jurisdiction* (4.34)
LDT	*local data tree* (4.36)
MICE	*mass information for compliance and enforcement* (4.38)
Op	*operator* (4.39)
PSP	*prime service provider* (4.40)
RAS	*regulated application service* (4.42)
RTM	*remote tachograph monitoring* (4.45)
SE	service element
TARV	*telematics* (4.52) applications for *regulated vehicles* (4.43)
VAC	*vehicle access control* (4.54)
VAM	*vehicle access management* (4.55)
VLM	*vehicle location monitoring* (4.56)
VMM	*vehicle mass monitoring* (4.57)
VSM	*vehicle speed monitoring* (4.58)
VSP	*vehicle secure parking* (4.58)

6 General overview and framework requirements

ISO 15638-1 provides a *framework* (4.28) and *architecture* (4.12) for *TARV*. It provides a general description of the roles of the actors in *TARV* and their relationships.

To understand clearly the *TARV* framework, *architecture* (4.12) and detail and *specification* (4.50) of the roles of the actors involved, the reader is referred to ISO/TS 15638-1.

ISO 15638-6 provides the core requirements for all regulated applications. To understand clearly the general context in to which the provision of this application service, the reader is referred to ISO 15638-6.

In order to be compliant with this part of ISO 15638, the overall architecture employed shall comply with ISO 15638-1.

In order to be compliant with this part of ISO 15638, the communications employed shall comply with ISO 15638-2.

In order to be compliant with this part of ISO 15638, the operating requirements employed shall comply with ISO 15638-3.

In order to be compliant with this part of ISO 15638, the security employed shall comply with ISO 15638-4.

In order to be compliant with this part of ISO 15638, the basic vehicle data shall comply with ISO 15638-5.

In order to be compliant with this part of ISO 15638, the generic conditions for this application service shall comply with ISO 15638-6.

ISO 15638 has been developed for use in the context of regulated commercial freight vehicles. There is nothing, however, to prevent a jurisdiction extending or adapting the scope to include other types of regulated vehicles, as it deems appropriate.

7 Requirements for services using generic vehicle data

The means by which the access commands for generic vehicle information specified in ISO 15638-5 can be used to provide all or part of the data required in order to support a *regulated application service* (4.42) shall be as defined in ISO 15638-6.

8 Application services that require data in addition to basic vehicle data

8.1 General

Shall be conducted as defined in ISO 15638-6.

8.2 Quality of service requirements

This part of ISO 15638 contains no general requirements concerning quality of service. Such aspects shall be determined by a *jurisdiction* (4.34) as part of its *specification* (4.50) for any particular *regulated application service* (4.42). However, where a specified *regulated application service* (4.42) has specific Q of S requirements essential to maintain interoperability, these aspects shall be as specified in Clause 10.

8.3 Test requirements

This part of ISO 15638 contains no general requirements concerning test requirements. Such aspects shall be determined by a *jurisdiction* (4.34) as part of its *specification* (4.50) for any particular *regulated application service* (4.42), and issued as a formal test requirements *specification* (4.50) document. However, where a specified *regulated application service* (4.42) has specific test requirements essential to maintain interoperability, these aspects shall be as specified in Clause 10 relating to this *regulated application service,* or in a separate standards deliverable referenced within that Clause. And where multiple *jurisdictions* recognize a benefit to common test procedures for a specific *regulated application service,* this shall be the subject of a separate standards deliverable.

8.4 Marking, labelling, and packaging

This part of ISO 15638 has no specific requirements for marking labelling or packaging.

However, where the privacy of an individual may be potentially or actually compromised by any instantiation based on the ISO 15638 family of Standards, the contracting parties shall make such risk explicitly known to the implementing *jurisdiction* (4.34) and shall abide by the privacy laws and regulations of the implementing *jurisdiction* and shall mark up or label any contracts specifically and explicitly drawing attention to any loss of privacy and precautions taken to protect privacy. Attention is drawn to ISO/TR 12859 in this respect.

9 Common features of regulated TARV application services

9.1 General

The details of the instantiation of *regulated application service* (4.42) are as designed by the application service system to meet the requirements of a particular jurisdiction (4.34) and are not defined herein. ISO 15638-6 specifies the generic roles and responsibilities of actors in the systems, and instantiations that claim compliance with this part of ISO 15638 shall also be compliance with the requirements of ISO 15638-6.

The means by which data are provisioned into the *data pantry* (4.22) and the means to obtain the *TARV LDT* (4.36) and *core data* (4.20) are described in ISO 15638-6, Clause 8.

In order to minimize demand on the *IVS* (4.30) [which it is assumed will be performing multiple *application services* (4.6) simultaneously, as well as supporting general safety related cooperative

vehicle systems], and because national requirements and system offerings will differ, a 'cloud' approach has been taken in defining *TARV regulated application services* (4.42).

The *TARV* approach is for the on-board *app* (4.5) supporting the application service to collect and collate the relevant data, and at intervals determined by the *app*, or on demand from the *application service provider* (4.7; *ASP)*, pass that data to the *ASP.* All of the actual application service processing shall occur in the mainframe system of the *ASP* (in the 'cloud').

For further information see ISO 15638-6, Clause 9.

At a conceptual level, The *TARV* system is therefore essentially simple, as shown in Figure 1. The process is similar to that for CoreData, but data are supplied to a different on-board file in the *data pantry* (4.22).

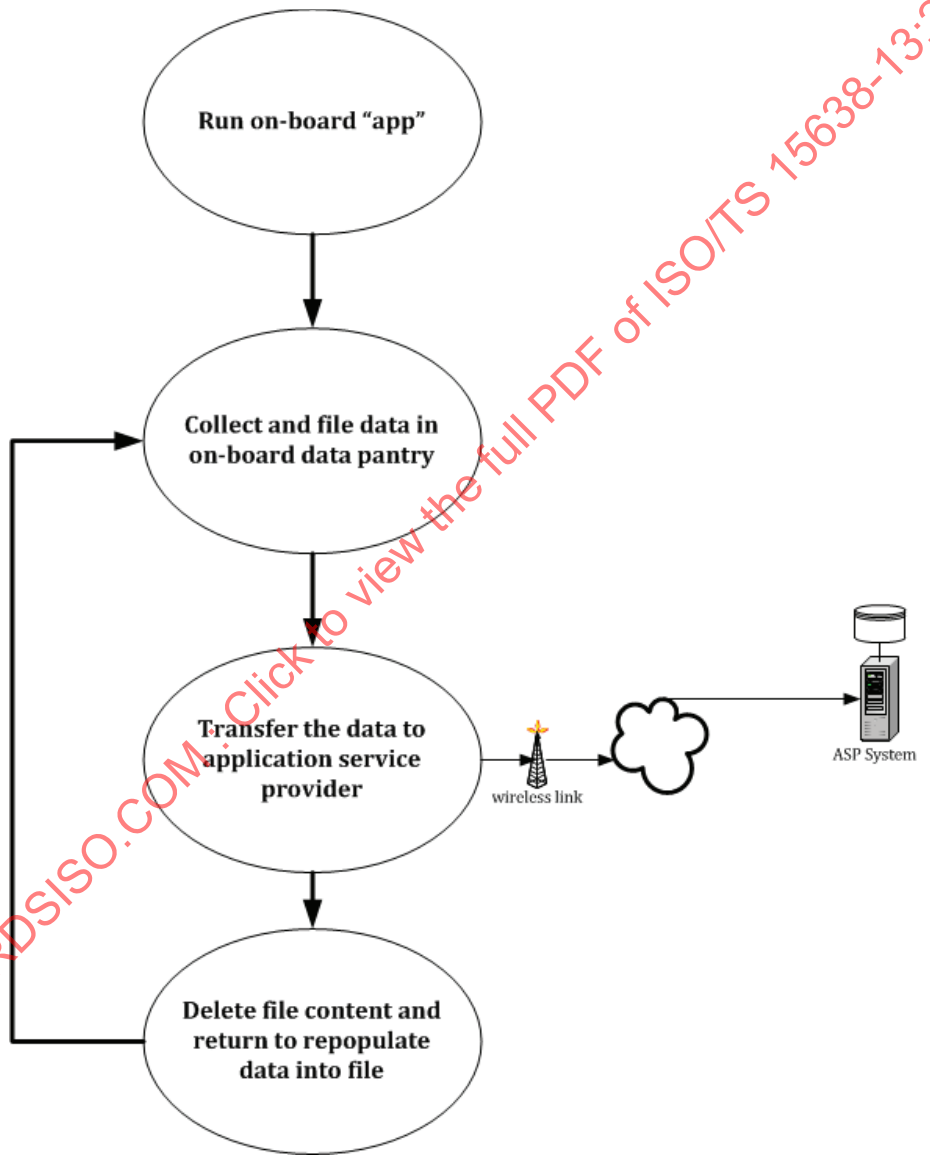

Figure 1 — TARV Regulated application service on-board procedure

At a common generic functional level for this application service, the process may be seen as shown in Figure 2; however, the connected equipment may/may not be required in all cases.

9.2 Common role of the jurisdiction, approval authority, service provider and user

The common role of the jurisdiction, approval authority, application service provider and user shall be as defined in ISO 15638-6, 10.2.4 and 10.2.5.

9.3 Common characteristics for instantiations of regulated application services

The common characteristics for instantiations of regulated application services shall be as defined in ISO 15638-6.

9.4 Common sequence of operations for regulated application services

The common sequence of operations for regulated application services shall be as defined in ISO 15638-6.

9.5 Quality of service

Generic quality of service provisions for *application services* (4.6) shall be as defined in ISO 15638-6.

9.6 Information security

Information security shall be as defined in ISO 15638-6.

9.7 Data naming content and quality

Data naming and quality shall be as defined in ISO 15638-6.

Variations specific to the *Mass* (4.37) information for jurisdictional control and enforcement *application service* (4.6) shall be as defined below.

9.8 Software engineering quality systems

Software engineering quality systems shall be as defined in ISO 15638-6.

9.9 Quality monitoring station

The availability of quality monitoring stations shall be as defined in ISO 15638-6.

9.10 Audits

Audits shall be as defined in ISO 15638-6.

9.11 Access control policy

To protect the data and information held by the *application service provider* (4.7), each provider shall adopt a risk-based data access control policy for employees of the provider.

9.12 Approval of IVSs and service providers

Generic provisions for the *approval* (4.9) of *IVSs* and *service providers* (4.48) shall be as specified in ISO 15638-3. Detailed provisions for specific *regulated applications* (4.41) shall be as specified by the regime of the *jurisdiction* (4.34).

10 Mass information for jurisdictional control and enforcement (MICE)

10.1 TARV MICE service description and scope — MICE use cases

10.1.1 General

The principles for gathering data from *regulated vehicles* by monitoring *mass* (4.36) by using sensing equipment on-board the *regulated vehicle* (4.42) have been described and defined in ISO 15638-12 (and are therefore not repeated herein).

The *Mass information for jurisdictional control and enforcement* (4.37; MICE) application takes this monitoring application further, by using *mass* (4.37) data as a basis for imposing jurisdictional control and penalties for violation of regulations, or exceeding limits imposed by the jurisdiction. For example, the control action may, at the discretion of the jurisdiction, restrict access of the regulated vehicle to all or some MICE zones; restrict the laden weight of the vehicle in MICE zones, or in general road use; change the taxation category of the vehicle (on a permanent or temporary basis); impose speed restrictions; or may use *mass* data as a basis for levying redress for exceptional damage to the road pavement or to exact a penalty fine.

Even where the action taken involves financial redress, MICE differs from electronic fee collection systems which apply to all classes of vehicle or specified classes of vehicles with tariffs based on vehicle class, and in some cases predefined parameters such as the weight of the load and/or the distance travelled. This application should not be confused with weight/volume: distance charging schemes (which are specified in other International Standards). The *Mass* (4.37) monitoring aspect of this application service obtains its *mass* calculations by dynamic real-time measurement of specific vehicles through equipment especially installed for this purpose to measure the *mass* impact on the road surface. It is, by definition, a service that can only be available to *regulated vehicles* that are especially equipped (usually by the requirement of the jurisdiction (4.34)) with electronic measuring equipment to provide the specialized *mass* data, and therefore, by definition are always 'regulated', and will probably in most cases necessitate regulation by the *jurisdiction* to require the installation and operation of the necessary equipment as part of the licensing conditions for the *regulated vehicle*.

For comparison, Figure 2 shows an overview *architecture* (4.12) model and related standards for generic ITS EFC.

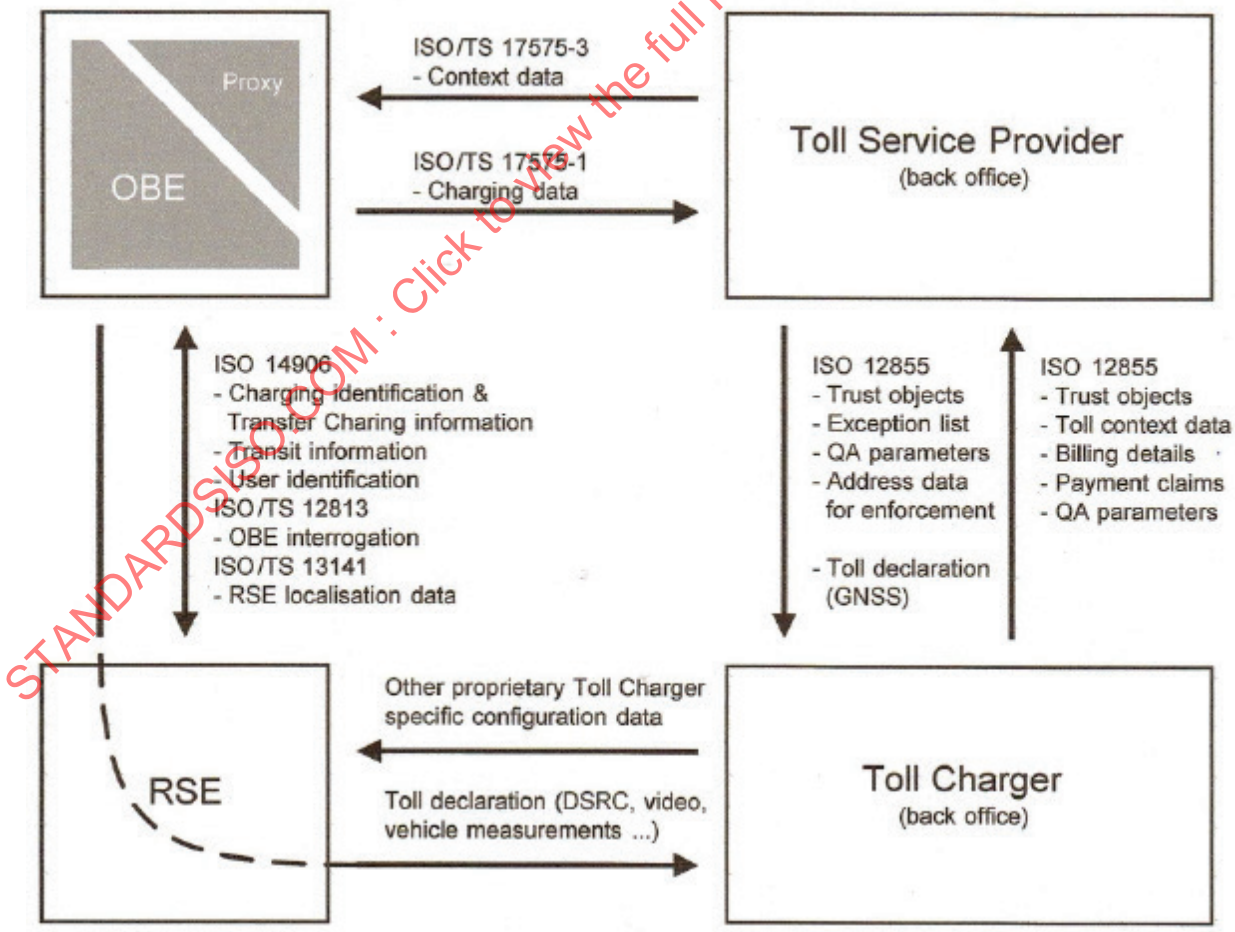

Figure 2 — Scope of Generic ITS EFC related standards (Source: ISO 12855)

To avoid confusion with aspects of EFC, it is also important to state that, as with the other 'application' parts of ISO 15638, this specification does not define the application itself. It does not define what measures are taken by a jurisdiction to impose its control, whether that be a restriction of some type, or a financial penalty or implication of some type. It does not define any application for collection of charges or fees. Whether any penalties and levies are paid in addition to, or in place of, other ITS EFC fees, is a matter for the *jurisdiction* (4.34), and outside of the scope of this part of ISO 15638. Those are issues between the jurisdiction and its' application service provider(s), or the subject of EFC standards.

This specification defines only the definition of a number of relevant data concepts, generically useful for MICE, and how they are transferred from an equipped and regulated vehicle to the application service provider to support any application service operated by the application service provider (to the instruction of the jurisdiction).

MICE is a specialized *regulated application service* (4.42) which combines elements from two other approved and published *TARV* application service use cases defined in ISO 15638, namely *vehicle access control* (ISO 15638-14, 4.54) and *vehicle mass monitoring* (ISO 15638-12, 4.57) and in itself could also be considered as a specialized use case of *vehicle access monitoring* (ISO 15638-8, 4.56) and *consignment and load monitoring* (ISO 15638-17, 4.26).

As with all *TARV application services* (4.6), MICE is based on the triumvirate relationships between the jurisdiction (4.34)/*application service provider* (4.7)/*user* (4.53) [vehicle *operator* (4.39) + *driver* (4.23)] shown in Figure 1 and Figure 3. It is dependent on data being fed to an *application service provider* (*ASP*) and the application service of the *ASP* providing both the reporting required by the *jurisdiction,* and in most cases calculating the control action due in accordance with the provisions of regulations imposed by the *jurisdiction,* and collecting any penalties and levies from the *operator* (4.39) on behalf of the *jurisdiction*/'road *operator* (4.39)'.

As with all *TARV application services* (4.6), this *TARV application service* specifies only the communications to the *regulated vehicle* (4.43) by the *jurisdiction* (4.34)/vehicle '*operator* (4.39)', and the interactive communications between the *regulated vehicle* and the *ASP* required to support the provision of the *application service.* The *application service* requirement itself is likely to vary from *jurisdiction* to *jurisdiction,* and the *application service provider* (4.7) shall most probably require the approval of its application service *specification* (4.50) and software by an *approval authority* (*regulatory*; 4.11) function appointed by the *jurisdiction* (see ISO 15638-1 and ISO 15638-3).

Figure 3 shows a view for the *TARV* aspects of a MICE *application service* (4.6). It is based on the generic *TARV architecture* (4.11) defined in ISO 15638-1, and shown in Figure 1 adapted for the MICE use case.

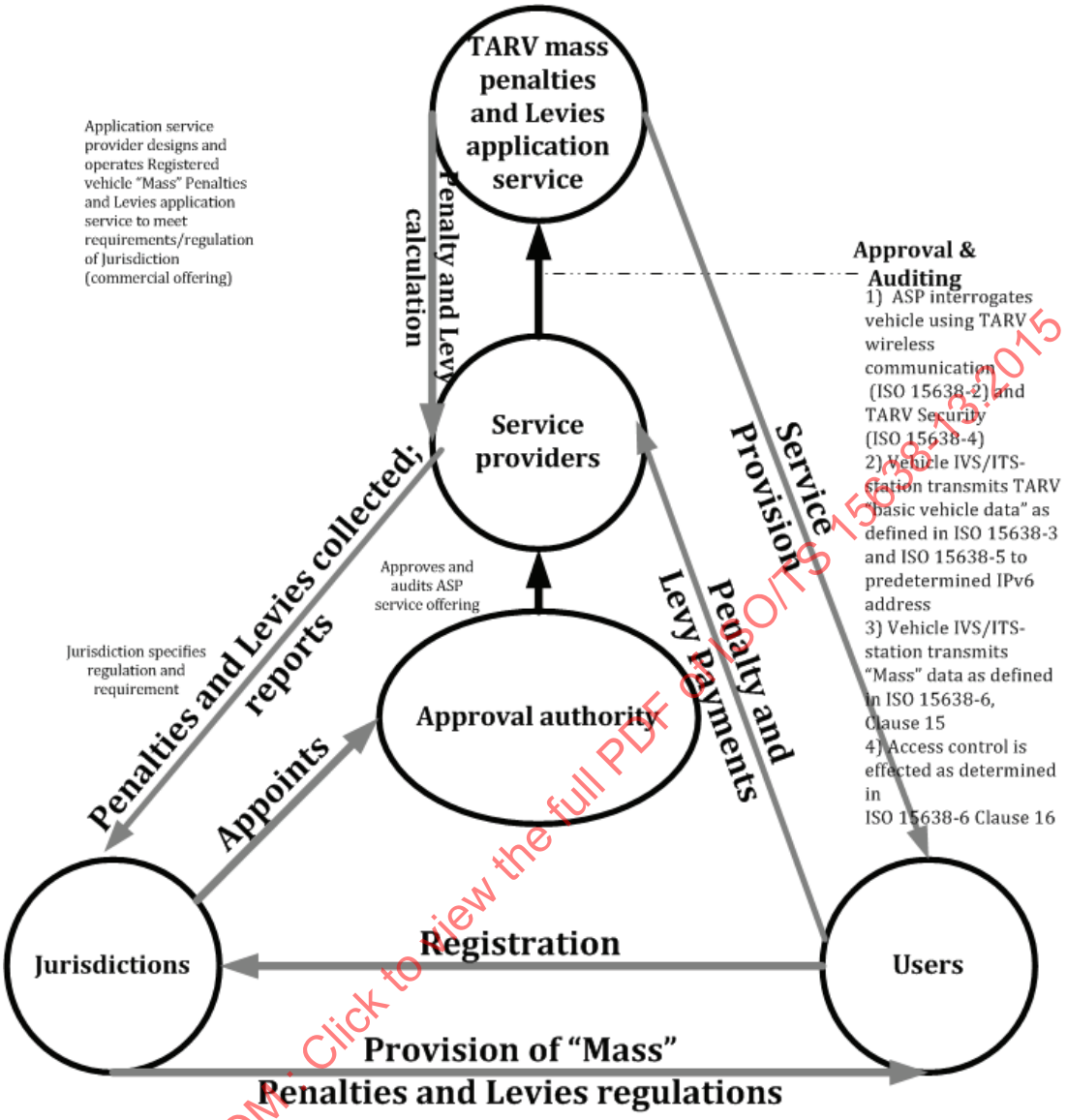

Figure 3 — Architecture for TARV *Mass* information for jurisdictional control and enforcement (service specific adaptation of ISO 15638-6, Figure 1)

10.1.2 Jurisdiction — Regulatory, safety, and funding

A *jurisdiction* (4.34) or its agent/'*road operator* (4.39)' are most likely to have one, or a combination of up to four, objectives for imposing MICE control measures the following:

a) to improve safety by discouraging overloading (which adversely affects vehicle braking performance and increases the probability of roll-over incidents) by the imposition of penalties for violations;

b) to encourage good practice by road *users* (4.53) [*regulated vehicle operators* (4.39) and *drivers* (4.23)] to encourage them to keep their *regulated vehicles* in a good mechanical condition that will minimize its toll on the road infrastructure;

c) to generate income to fund road regeneration and enhancement on a basis of paying according to the amount of wear and tear being caused;

d) to balance 'tax' regimes between different classes of vehicle in order to create a fairer marketplace.

NOTE The above list is a 'typical' list. Specific jurisdictions may have other motivations for implementing TARV–MICE.

10.1.3 Vehicle operators – Regulatory observance

Where required by the regulation of the *jurisdiction* (4.34), vehicle *operators* (4.39) will need to implement the control measures as determined by the *application service* (4.6). This may require better control of the vehicle and its loading, restriction of use of certain roads, or to pay any penalties and levies for *regulated vehicle*s to operate within the MICE zones based on vehicle *mass* (4.37) data collected during operation of the *regulated vehicle* (4.43). Alternatively, they may need to pay penalty charges for violation of regulations (such as overweight, or inappropriate use on roadways with weight or size restrictions), or both. Vehicle *operators* may also need to monitor the progress of their vehicle as it passes through the MICE zone. Such required actions will be defined by the regulations of the jurisdiction and assessed by the landside application service provided by the application service provider, and are outside the scope of this specification.

NOTE Future standards in this series may specify consequential control measures within the regulated vehicle.

10.1.4 Jurisdiction — Assessment and collection

In the case where the consequence of MICE control is that a levy or penalty is to be applied to a *regulated vehicle* for travel or a violation within the MICE zone, or redress levied to use the *regulated vehicle* (4.43) in the MICE zone, *jurisdictions* (4.34) need access to data obtained from the *regulated vehicle* in order to exert and enforce such control, and this shall be provided by the *ASP,* based on data collected by the *ASP* from the vehicle. Any financial payment transactions calculated or paid shall be an issue of the landside application service and the *jurisdiction*, and are outside the scope of this specification.

This part of ISO 15638 uses the premise that the *ASP* (4.7) shall usually be responsible to make the calculation of penalties and levies due, and specifies provision for this. However, if a *jurisdiction* (4.34) wishes to retain control of that function directly, it may receive the data, take the responsibility to make the penalty or levy calculated, and advise the *ASP* of the resultant amount to be levied on the *user* (4.53), and thereby operate within the *specifications* (4.50) of this part of ISO 15638-6.

10.1.5 Approval authority — Approval and audit of ASP system

The *approval authority* (*regulatory*; 4.11) function of the *jurisdiction* (4.34) shall approve or approve by whatever means determined by the *jurisdiction,* that the MICE application system of the *ASP* (4.7) meets the requirements of the *jurisdiction.*

10.2 Concept of operations for *Mass* information for jurisdictional control and enforcement (MICE)

10.2.1 General

The general concept of operations is the control and enforcement of regulated vehicles based on *Mass* (4.37) data collected from the vehicle during use. This involves new and emerging technologies, and there are many permutations of how this service can be achieved and for the purposes of this *specification* (4.50), they are grouped on three potentially complementary concepts; these are the following:

a) control measures, including penalties, based on violation of *access* (4.1) conditions (usage restrictions or use on inappropriate roads);

b) adjustment of the taxation regime of the vehicle based on *Mass* (4.37) data collected combined with time of travel, and/or distance of travel, including incremental levies;

c) penalties or levies for exceeding agreed limits of wear and tear imposed on specific roads using *Mass* (4.37) measurement (overloading/badly distributed loads, etc.).

At the stage of development of the technology at the time of developing this part of ISO 15638, significant issues remain about the accuracy of the *mass* (4.37) technology required for enforcement and the accuracy required for routine levies. Also, the accuracy of the equipment is developing rapidly over time

and there are concerns that the *specification* (4.50) of accuracy parameters as a basis of levies could render some equipment obsolete. But *TARV* does not have to make decisions regarding these aspects, because *TARV* uses the *jurisdiction* (4.34)/*application service provider* (4.7)/*user* (4.53) triumvirate *architecture* (4.12). The precise requirements are specified by *jurisdictions* at some future time, and revised at future times by *jurisdictions*, and the *application service* (4.6) which meets the requirements is designed and operated by the *application service provider* (*ASP*). This *specification* (4.50) has only to define what essential data are relevant and how it gets to the right place at the right time.

NOTE Mechanisms specified in 8.3 provide means for *jurisdictions* (4.34) to specify and require further additional data, where required.

ISO 15638-12 specified the data concept definitions and transfer methodologies for *mass* (4.37) monitoring. This part of ISO 15638 therefore specifies only how (and to some extent when) to get the data to the *ASP* (4.7) and the triggers for the update and release of that data. The actual criteria that are used to *impose* MICE are a matter for the *jurisdiction* (4.34). In defining such requirements *jurisdictions* shall wherever possible, use performance based or functionally based *specifications* (4.50) in order to avoid locking requirements into technologies that will become obsolete.

The *specifications* (4.50) of this part of ISO 15638 are therefore designed to be as future-proof and stable as possible, focused on the form of the data concepts to be acquired and sent (rather than the technology used to acquire that data) and should be reasonably future proof.

10.2.2 Statement of the goals and objectives of the TARV MICE system

This objective of this part of ISO 15638 is to provide standardised support for generic data collection for a MICE application service system.

Access control (4.2) may or may not be pertinent.

The basic concept for MICE is to provide data to the *application service provider* (4.7) in an appropriate form at appropriate times and to determine the roles and responsibilities for the system.

This part of ISO 15638 does not attempt to specify how MICE requirements are specified nor how their application service provision is designed and installed, only to specify the communication *sessions* (4.49) required between the *regulated vehicle* (4.43) and the *application service provider* (4.7), and in some cases communication from the *jurisdiction* (4.34)/road *operator* (4.39) to the *regulated vehicle*. Most transactions, and particularly the complexities of converting the data to levies, are made between the *ASP* (4.7) and the MICE zone management centre of the *jurisdiction,* or between the *regulated vehicle* (4.43) *operator* (4.39)/*application service provider*/MICE zone management centre, and all of these communications and exchanges are outside of the scope of this part of ISO 15638.

Without specifying the application detail, the generic overview MICE use case is shown in Figure 4.

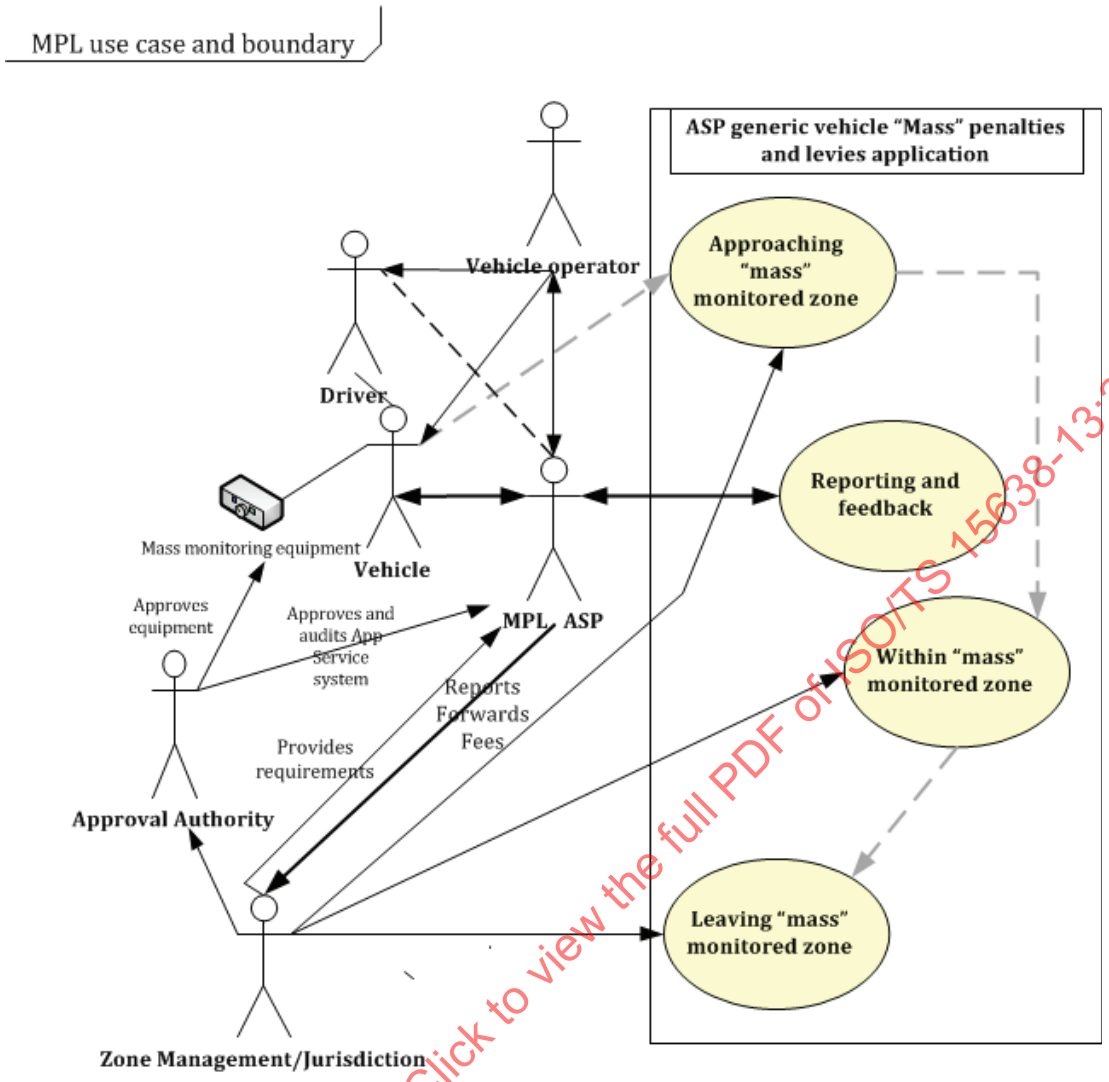

Figure 4 — MICE use case and boundary

10.2.3 Strategies, tactics, policies, and constraints affecting the system

The strategy of this part of ISO 15638 is to specify how, and trigger points to get, *mass* (4.37) measurement and other vehicle related data from a vehicle to the MICE (4.38) application system of the *ASP* (4.7) in a manner that can be considered reliable and accurate by the *jurisdiction* (4.34) and can be used as a basis for a MICE application.

The intention is that (usually approved) *mass* (4.37) measuring equipment/products shall provide *regulators* (4.44) with a means of obtaining *mass* compliance information, via *TARV*, to a minimum required level of accuracy, robustness and reliability, by using approved systems of *application service providers* (4.7) both to provide required data to the *jurisdiction* (4.34), and also (in most cases) to enable the *ASP* to take control actions and/or calculate, and collect, penalty charges and penalties and levies from the *users* (4.53) on behalf of the *jurisdiction,* and forward these funds to the *jurisdiction.*

Individual *jurisdictions* (4.34) may have specific requirements in respect of the key or critical aspects of vehicle *mass* (4.37) measurement, but this detail is a function for system design to meet the requirement of the *jurisdiction,* and satisfy the needs of *users* (4.53). Mechanisms specified in 8.3 provide means for *jurisdictions* to specify and require further additional data, where required.

10.2.4 Organisations, activities, and interactions among participants and stakeholders

10.2.4.1 Actors

The principle actors that comprise the system are

— *driver* (4.23),

— *regulated vehicle* (4.43),

— *application service provider* (4.7), and

— *jurisdiction* (4.34)/*road operator* (4.39).

It should be noted that an entity may perform multiple roles and in doing so takes on the responsibility to perform the functions described under those roles.

Table 1 provides a list of the actors involved, their activities and interactions.

Table 1 — TARV MICE actors involved, their activities and interactions

Actor	Role	Activities	Interactions
Jurisdiction (J; 4.34)	Sets requirements for mandatory and supported *TARV* MICE	Publishes *specifications* (4.50)	ALL
		Obtains regulations	ALL: Establish regime and regulations PSP: Register *TARV* equipment ASP: Register application, receive reports Op: Vehicle registration Dr: Licence
		Appoints *approval authority* (if required)	AA: Contract. Instruct. Receive reports
		Contacts vehicle for data at specific points	Ve: Provides data to *ASP*
		Monitors reports	
		Instigates any enforcement	
		Receives penalties and levies	Op: Pays penalties and levies ASP: Forwards penalties and levies to *jurisdiction*
Approval authority (AA; 4.12)	Implements *jurisdiction* policy at equipment and service approval level	Approves *IVS* (4.30), and vehicle *mass* (4.37) monitoring equipment, *Application Service* (4.6) instantiations	PSP: Approve *IVS* PSP: Approve *mass* monitoring equipment
	ASP: Approve application service		ASP: Approve application service
		Conducts Q of S maintenance to instruction of *jurisdiction*	
Prime service provider (PSP; 4.41)	Responsibility for *IVS*	Installs and/or commissions *IVS*	AA: May Apply to approve *IVS* Op; Installation

Table 1 *(continued)*

Actor	Role	Activities	Interactions
		Maintains *IVS*, and *mass* monitoring equipment	Op: Maintain *IVS* and *mass* monitoring equipment
		Responsibility for *mass* monitoring equipment Installs and/or commissions *mass* monitoring equipment	AA: May apply to approve *mass* monitoring equipment Op: Installation
Application service provider (ASP; 4.8)	Provides *TARV* MICE application support services	Develops instantiation of *TARV* MICE *application service*	AA: Applies for approval of Service
		Contracts with *users* (4.53)	Op: Contracts
		Provides *TARV* MICE application support services to *users* and *jurisdiction.* Collects penalties and levies from *operators* Forwards penalties and levies to *jurisdiction*	Op: Provides service Dr: May provide service J: Provides service/reports Op: Pays penalties and levies to *ASP* J: Receives penalties and levies
operator (Op; 4.39)	Provides *regulated vehicle* (4.43)	Employs/contracts *drivers* (4.23)	Dr: Employs/Contracts
	Uses *regulated vehicle* for commerce and logistics	Operates *regulated vehicle*- pays appropriate penalties and levies	J: Registers *regulated vehicle* PSP: Contracts, receives service (install/maintain) ASP: Contracts, receives service, control measures; Pays penalties and levies calculated by *ASP* *ASP*: Receives penalties and levies
		Receives reports from *ASP*	
Driver (Dr; 4.23)	Drives *regulated vehicle* to instruction of *operator* (4.39)		Op: to instructions
		May sign into *TARV* MICE system	IVS: May sign *driver* (4.23) into system
		Drives *regulated vehicle*	

The general use case is depicted in Figure 4 and in the collaboration diagram shown in Figure 5.

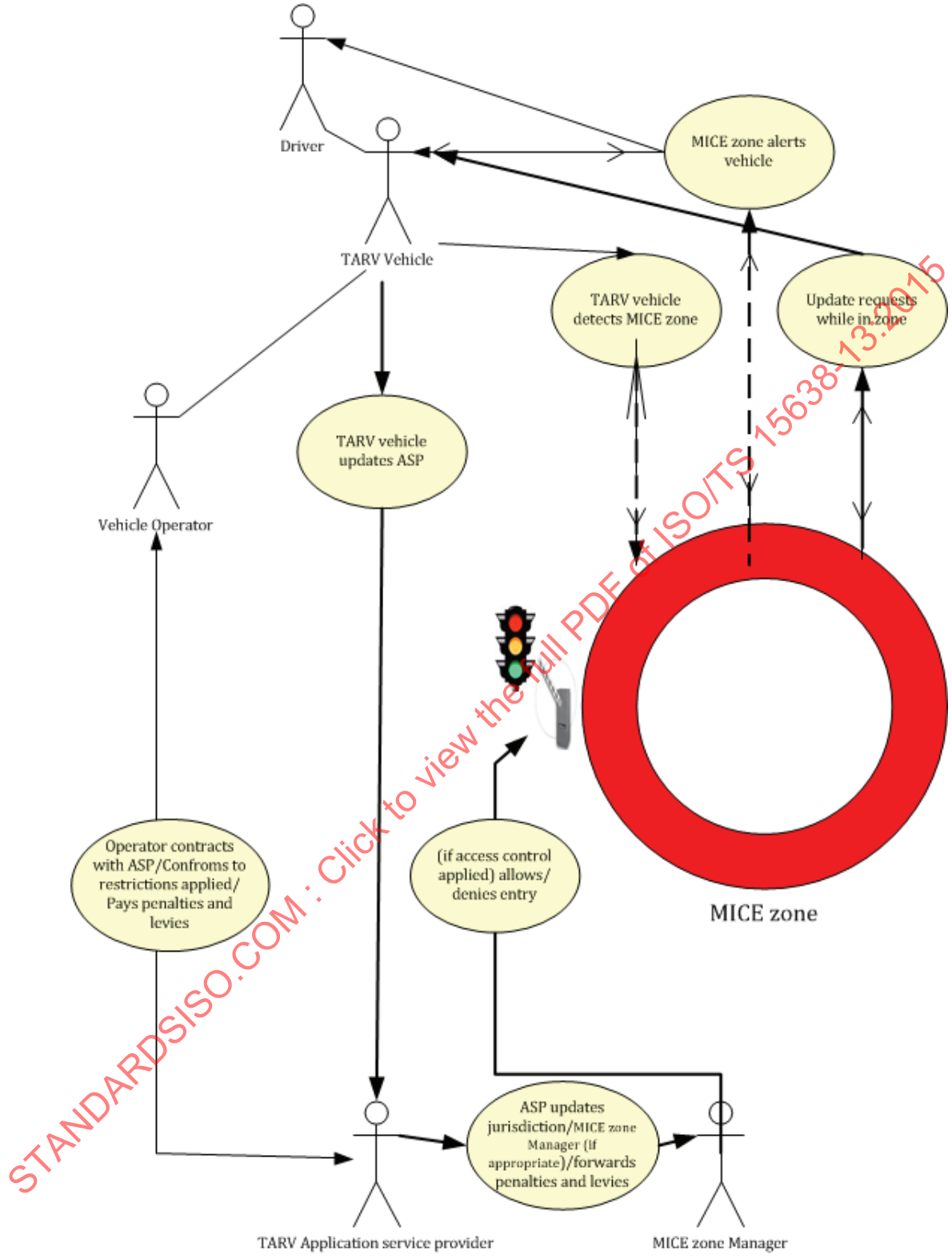

Figure 5 — MICE zone collaboration diagram

10.3 Vehicle *Mass* information for jurisdictional control and enforcement data (MICED)

The information required for vehicle *Mass* (4.37) penalties and levies shall comprise the following data (hereafter referred to as the '*Mass* information for jurisdictional control and enforcement data' (MICED):

— *basic vehicle data* (4.14) as specified in ISO 15638-5.

— *mass* data as specified in ISO 15638-12.

— If the *regulated vehicle* (4.43) is so equipped, the *ASP* (4.7) may also obtain the *driver* (4.23) identification, and possibly load and its status if this is information required by the *jurisdiction* (4.34). (If the *regulated vehicle* is not equipped to provide *driver* data, or load data and if this is required information, then the *ASP* has the responsibility to obtain and provide that data by other means).

— If the *jurisdiction* controlling the MICE (4.38) zone requires additional data (to that specified in ISO 15638-12) supplied from the *regulated vehicle*, then either it shall provide an *app* (4.5) to the *ASP* who shall be responsible to preload the *app* into the memory of the *IVS* (4.30) of the *regulated vehicle*, or the *ASP* shall devise and install such an *app*, and the MICED shall include this additional data as provided in 8.3 above.

10.4 MICE use cases

Five use cases have been identified, namely

a) approaching *mass* (4.37) zone,

b) within *mass* zone,

c) leaving *mass* zone,

d) reporting, and

e) possible *access control* (4.2).

10.4.1 Approaching MICE zone

As the *regulated vehicle* (4.43) approaches the MICE zone, either of the following shall be performed:

a) The *ASP* (4.7) of the *regulated vehicle* shall make contact with the *regulated vehicle* to request its MICED.

b) An *app* (4.5), designed and preloaded by the *ASP* into the library of the *IVS* (4.30) of the *regulated vehicle* (see ISO 15638-1) is running and by means unspecified (but such as recognized location reference) shall alert the *IVS* of the *regulated vehicle* that it is approaching a MICE zone and shall request its MICED.

c) An *ITS-station* (4.32) of the *jurisdiction* (4.34) or its agents shall make contact with, or broadcast, to the *ITS-station* (4.32) of the *IVS* of the *regulated vehicle* advising that the *regulated vehicle* is approaching the MICE zone and shall request its MICED.

d) The *jurisdiction* or its agents shall by some other (unspecified) means alert the *driver* (4.23) of the *regulated vehicle* advising that the *regulated vehicle* is approaching the MICE zone, and the *driver* shall trigger (by means unspecified in this part of ISO 15638) the *IVS* to send the MICED.

This use case assumes that *mass* (4.37) control actions and any resultant penalties and levies shall only be applied in MICE (4.38) zones. However, if *mass* levies apply to all zones within the *jurisdiction* (4.34), then the MICE zone is simply the entire domain of the *jurisdiction* and MICE would apply as soon as the *regulated vehicle* (4.43) enters the road network of the *jurisdiction.*

10.4.2 Within MICE zone

Depending on the nature of the instantiation, there may be a requirement for frequent and regular updates of the MICED, or a requirement for such data at particular locations (such as the approach to a bridge, or a physical inspection point), or a combination of both situations. The requirement to provide data at a particular location may be the following:

a) The *ASP* (4.7) to the *regulated vehicle* (4.43), using criteria determined by the *ASP*, shall make contact with the *regulated vehicle* to request its current `MICED`.

b) An *app* (4.5), designed and preloaded by the *ASP* into the library of the *IVS* (4.30) of the *regulated vehicle* (see ISO 15638-1) is running and by means unspecified (but such as recognized location reference) shall alert the *IVS* of the *regulated vehicle* to send its `MICED` to the *ASP*.

c) An *ITS-station* (4.32) of the *jurisdiction* (4.34)/road *operator* (4.39) or its agents shall make contact with the *ITS-station* of the *IVS* of the *regulated vehicle* requesting the `MICED`.

d) The *jurisdiction* or its agents shall by some other (unspecified) means alert the *driver* (4.23) of the *regulated vehicle* advising that the *regulated vehicle* is approaching a MICE point, and the *driver* shall trigger (by means unspecified in this part of ISO 15638) the *IVS* to send the `MICED`.

The *IVS* (4.30) of the *regulated vehicle* (4.43) shall respond by closing any communication *session* (4.49) with the ASP (4.7) or *ITS-station* (4.32) of the *jurisdiction* (4.34) or its agents, or any other interrogation. The IVS of the *regulated vehicle* shall update its *basic vehicle data* (4.14) and shall then send the `MICED`, to the IPv6 address previously determined by the *ASP*, who verifies and processes data received, and shall forward the data to the system of the *jurisdiction* or its agents according to the regulations of the jurisdiction.

10.4.3 Leaving MICE zone

Depending on the nature of the instantiation, there may be a requirement to provide the `MICED` when exiting from the MICE zone. In which case, one of the procedures specified in 10.4.2 shall be followed.

10.4.4 Reporting

There are several reporting interactions involved in MICE:

10.4.4.1 IVS to ASP

The *IVS* (4.30) of the *regulated vehicle* (4.43) shall respond to any of the requests specified in 10.4.1 to 10.4.3 by

a) closing any communication *session* (4.49) with the *ASP* (4.7) or *ITS-station* (4.32) of the *jurisdiction* (4.34) or its agents, or any other interrogator,

b) updating its current *basic vehicle data* (4.14),

c) then sending the `MICED` to a previously determined IPv6 address supplied by the *ASP*, and

d) and then closing the communication *session* (4.49).

The communication between the *ITS-station* (4.32) of the *IVS* (4.30) of the *regulated vehicle* (4.43) and the receiving *ITS-station* of the *ASP* (4.7) shall be as determined in ISO 15638-6, 8.3, with data from the *regulated vehicle* always provided to a predetermined IPv6 address in a separate communication from that of any interrogation, (in accordance with ISO 15638-1).

The communication medium shall be as determined in ISO 15638-2, with security provisions in accordance with ISO 15638-1, ISO 15638-2 and ISO 15638-4.

10.4.4.2 ASP to jurisdiction

The *ASP* (4.7) shall then provide the data sent from the *IVS* (4.30) of the *regulated vehicle* (4.43) and processed by its application to the *jurisdiction* (4.34) by the means determined by the *jurisdiction* (and outside of the scope of this part of ISO 15638). The *ASP* shall be responsible to provide the *jurisdiction* with the data required by the regulations controlling *access* (4.1) conditions for the MICE zone, instructing the *operator* (4.39) in respect of any enforcement actions, and forwarding payment of any penalties and levies collected from the *operator* to the *jurisdiction.*

10.4.4.3 ASP to operator

The *ASP* shall have a contract in place with the *regulated vehicle* (4.43) *operator* (4.39). That contract shall determine how and when reporting is made to the *operator*. The contract shall also determine how the *ASP* (4.7) instructs and monitors control measures, and collects any penalties and levies due from the *operator*. The *ASP,* at the frequency and in the manner defined in its contract with the *operator* (4.39), shall advise the *operator* of penalties and levies.

10.4.4.4 Jurisdiction to ASP

The *jurisdiction* (4.34) shall have by some means approved/accepted the MICE application of the *ASP* (4.7). The *jurisdiction* shall keep the *ASP* informed and up to date in respect of the basis and scale of enforcement control measures and tariffs of penalties and levies. Most commonly, the *ASP* is expected to calculate control and enforcement measures and any resultant penalties and levies from the information provided to it by the *jurisdiction,* but the *jurisdiction* may opt to receive the raw data and calculate the control and enforcement measures and any resultant penalties and levies itself, providing the results to the *ASP* for the *ASP* to impose any control measures, or obtain any penalty or levy payments, from the *operator* (4.39) on its behalf.

10.4.4.5 Jurisdiction to operator

The *jurisdiction* (4.34) shall publish or otherwise keep the *operator* (4.39) updated with the tariff of control and enforcement measures and any penalties and levies. In the case of violations, the *jurisdiction* may have obligation for certain communication with the *operator* (4.39) in accordance with local regulation.

The *jurisdiction* (4.34) shall acknowledge and provide receipts for control and enforcement actions taken and any associated penalties and levies received.

10.4.4.6 Jurisdiction to driver

When approaching, within, or exiting from the MICE zone, where no other communications means exist, the *jurisdiction* (4.34) may make contact with the *driver* (4.23) (by whatever means) to request that the MICED is sent.

The *jurisdiction* (4.34) may contact or pursue the *driver* (4.23) (by whatever means are defined in the regulations of the *jurisdiction*) in the event of violation of local regulations.

10.4.5 Possible access control

Where *access control* (4.2) measures are in place approaching, within, or exiting from, the MICE zone, they shall be practiced in accordance with the provisions of ISO 15638-14.

10.5 Clear statement of responsibilities and authorities delegated

10.5.1 The *jurisdiction* (4.34) shall be responsible for the regime and regulations. The *jurisdiction* shall be responsible for determining the regulation and *access* (4.1) policies and admission practices of the MICE zone, its control measures and any penalties and tariffs, and making such regulations as required for its management, and shall be responsible for making such regulations, control measures, penalties and tariffs readily, freely and fairly accessible to *ASP*s (4.7), vehicle *operators* (4.39), and *drivers* (4.23).

10.5.2 The *jurisdiction* (4.34) shall employ an *approval authority* (*regulatory*; 4.11) or otherwise provide its function.

10.5.3 The *jurisdiction* (4.34) shall provide means for enforcement (where required) to meet the requirements of the regime of the *jurisdiction*.

10.5.4 The *jurisdiction* (4.34) shall provide the *ASP* (4.7) and/or the *regulated vehicle* (4.43) *operator* (4.39) with receipt for any control and enforcement actions instructed or for any applied penalties and levies, including detail of the basis of the amounts levied.

10.5.5 The *prime service provider* (4.40) shall install/commission *IVS* (4.30) and *mass* (4.37) monitoring equipment and maintain the *IVS* and *mass* monitoring equipment.

10.5.6 The *prime service provider* (4.40) shall install/commission, or supervise the installation/commissioning of any on-board equipment connected to the *IVS* (4.30).

10.5.7 The *application service provider* (4.7; *ASP*) shall develop the *TARV* MICE application service or use a *TARV* MICE application service provided by the *jurisdiction* (4.34).

10.5.8 The application service provider (4.7) shall obtain any required approval (4.9) of its TARV MICE service from the approval authority (regulatory; 4.11) function of the jurisdiction (4.34).

10.5.9 The application service provider (4.7) shall contract with the operator (4.39) of the regulated vehicle (4.43).

10.5.10 The application service provider (4.7) shall be responsible to provide the application service (4.6) to jurisdiction (4.34), operator (4.39) and driver (4.23) as specified in its contract with the operator (4.39). The ASP shall be responsible to inform the driver (by whatever means the ASP deems appropriate and the jurisdiction considers adequate), of regulations in respect of access (4.1) to the MICE zone and the rules and procedures for entering the MICE zone in as much as this information is required for the driver to perform his tasks and remain within the regulations pertaining.

10.5.11 The *operator* (4.39) shall be responsible to provide the *regulated vehicle* (4.44).

10.5.12 The *operator* (4.39) shall be responsible to abide by requirements of the regime re *TARV* MICE.

10.5.13 The *operator* (4.39) shall be responsible to effect and comply with any control measures, and pay penalties and levies required by *jurisdiction* (4.34), *prime service provider* (4.40) and *application service provider* (4.7). Where appropriate the *operator* (4.39) shall enact or instruct any control or enforcement measures and pay any penalties and levies due to the *jurisdiction* or its agents, or pay the *jurisdiction* via its *ASP*, but it shall always be the *operator* who is responsible for the payment of such penalties and levies.

10.5.14 The *driver* (4.23) shall be responsible to follow instructions, including use of the *IVS* (4.30) and associated equipment.

10.6 Equipment required for TARV MICE

10.6.1 TARV IVS

10.6.1.1 The system shall be designed to work using *TARV IVS* (4.30) as defined in the ISO 15638 suite of standards deliverables, together with *mass* (4.37) monitoring equipment, in order to achieve the requirements of ISO 15638-12.

10.6.1.2 The *prime service provider* (4.40)/*application service provider* (4.7) shall provide to the *approval authority (regulatory)* (4.11), evidence of compliance from an appropriate body to demonstrate the suitability of its product/service for use in vehicles for the *IVS* (4.30), *mass* (4.37) monitoring equipment, and all associated components.

10.6.1.3 It shall not be possible for collected or stored vehicle data or vehicle data in any software or non volatile memory within the *IVS* (4.30) or *mass* (4.37) monitoring equipment to be accessible or capable of being manipulated by any person, device or system, other than that authorized by the *application service provider* (4.7) or *prime service provider* (4.40).

10.6.2 Equipment periphery/connected to the IVS

10.6.2.1 For convenience, or to meet the requirements of other parts of ISO 15638, a *regulated vehicle* (4.43) may have other equipment that is periphery/connected to, the *IVS* (4.30) (for example, driver input device, driver identification device, etc.)

Where such equipment is used it shall have been properly installed by the *prime service provider* (4.40) as approved by the *approval authority (regulatory)* (4.11) of the *jurisdiction* (4.34).

10.6.2.2 This part of ISO 15638 specifies the *framework* (4.28) for the communications requirements with vehicles, for the collection of MICE data for on *regulated vehicle*s (4.43) into/within/exiting MICE zones. It does not specify the specific data collection requirements that such a system may require in addition to *basic vehicle data* (4.14) and *mass* (4.37) monitoring data. These aspects are a matter for local regulation/system design. If these local system *specifications* (4.50) require data to be collected from additional equipment connected to the *IVS* (4.30), that shall be a local decision which requires clear *specification* (4.50) and control by the *jurisdiction* (4.34) and is outside the scope of this part of ISO 15638. The provisions of Clause 8 may however be used to transmit such data.

10.6.3 TARV MICE 'app'

The *ASP* (4.7) shall design and upload an *app* (4.5) designed to provide data to support the *TARV* MICE application or shall install an *app* designed by the *jurisdiction* (4.34), to provide the MICED and any data in addition required by the *jurisdiction.* The *specification* (4.50) of that *app* is a matter for the *ASP* and/or *jurisdiction* and is outside the scope of this part of ISO 15638.

10.6.4 MICE applications and systems

TARV support for the MICE application service is designed for use where such services are restricted to *regulated vehicle*s [4.43; howsoever, these are defined by the *jurisdiction* (4.34)], where MICE control is an intrinsic part of such systems. This part of ISO 15638 is appropriate only for control and enforcement and where appropriate any penalty measures based on data from *Mass* (4.37) measurement equipment installed in the regulated vehicle.

For reasons of commercial efficiency, interoperability and reuse, where fee collection for *regulated vehicle* (4.43) *access* (4.1) to a controlled zone (4.18) is part of a general automatic fee collection system for purposes such as road charging, that apply to all classes of vehicles, without specific provisions for levies based on *mass* (4.37) monitoring, implementers shall give precedence to and use the International Standards designed for ITS electronic fee collection wherever practicable, in preference to this *specification* (4.50).

10.7 Operational processes for the system

10.7.1 Define and update MICE zone

10.7.1.1 A MICE (4.38) zone shall be defined by the *jurisdiction* (4.34), and an approaching (monitoring) area identified with adequate range, where the *regulated vehicle* (4.43) approaching the MICE zone shall be tracked and monitored in order to notify its entry to the MICE zone.

10.7.1.2 The MICE (4.38) zone shall be defined and declared to all affected parties. Public authorities and/or road operators shall publish/define in advance the MICE zone definition, the policies/rules and tariff of penalties and levies.

10.7.2 Operational processes for the system — Approaching MICE zone

10.7.2.1 The *regulated vehicle* (4.43) is identified as approaching the MICE (4.38) zone (as determined in 10.4.1).

10.7.2.2 The IVS of the *regulated vehicle* (4.43) shall update and send MICED to its *ASP* (4.7).

10.7.2.3 The *ASP* (4.7) sends MICED to the *jurisdiction* (4.34), or calculates control actions and sends that data to the *jurisdiction* or its agent; or

10.7.2.4 *ASP* (4.7) instructs the *driver* (4.23) not to enter MICE zone and provides re-routing information to the *driver.*

10.7.3 Operational processes for the system — within MICE zone

Depending on the nature of the instantiation, there may be a requirement for frequent and regular updates of the MICED, or a requirement for such data triggered at particular locations (such as the approach to a bridge, or a physical inspection point), or a combination of both situations, as determined in 10.4.2.

10.7.4 Operational processes for the system — exiting MICE zone

Depending on the nature of the instantiation, there may be a requirement to provide the MICED when exiting from the MICE zone. In which case one of the procedures specified in 10.4.2 shall be followed.

10.7.5 Reporting

Reporting interactions shall be as determined in 10.4.4.1. The reference points for the 'Reporting' use case are:

10.7.5.1 In advance of journey, the *jurisdiction* (4.34) or its agents advise *ASP* (4.7) of its information requirements in respect of data to calculate any control actions, penalties or levies for the *regulated vehicle* (4.43) while within the MICE zone; or

10.7.5.2 *Jurisdiction* (4.34) or its agents advises *ASP* (4.7) of its information requirements for the *regulated vehicle* (4.43) in response to receipt of notification of vehicle approaching the MICE zone.

10.7.5.3 *ASP* (4.7) sends relevant data to *jurisdiction* (4.34; usually including recommendations for control and/or enforcement measures including where appropriate any calculation of any penalties and levies) together with authorisation of, and means of, the *operator* (4.39) fulfilling the control and enforcement measures, and/or paying, any penalties and levies due.

10.7.5.4 If *access control* (4.2) is in operation, the *jurisdiction* (4.34) or its agents process the received data in order to decide to grant or deny *access* (4.1) to the MICE zone. In the event that *access* is to be denied, the system of the *jurisdiction* or its agents system shall have a means of informing the *driver* (4.23), *ASP* (4.7), and *operator* (4.39), that *access* is being denied to the specific *regulated vehicle* (4.43). The means by which such notification is provided is a function of system design and is not specified in this part of ISO 15638.

10.7.5.5 If *access control* (4.2) is in operation, the *jurisdiction* (4.34) or its agents shall otherwise permit and enable *access* (4.1) (by lifting or lowering barriers, using control lights, or whatever means are appropriate), and during the passage through the MICE zone, or at the point of exit from the MICE zone, may similarly operate multiple *access control* mechanisms. *Access control* shall be operated in a manner consistent with the requirements of ISO 15638-14.

10.7.5.6 *ASP* downloads *app* (4.5) into the library of the *IVS* (4.30; preferably in advance) to program the *IVS* of the *regulated vehicle* (4.43) to provide MICED at requested intervals or triggers; or

10.7.5.7 *ITS-station* (4.32) of *jurisdiction* (4.34) or its agents interrogate the *IVS* (4.30) of the *regulated vehicle* (4.43) at points where it requires and updated MICED.

10.7.5.8 In response to the installed *app* (4.5), or a prompt from an *ITS-station* (4.32) of the *jurisdiction* (4.34) or its agents, the *IVS* (4.30) of the *regulated vehicle* (4.43) shall update and send MICED, to the IPv6 address previously determined by the *ASP* (4.7), who shall verify and forward the data to the system of the *jurisdiction* or its agents in a manner agreed with or specified by the jurisdiction (4.34).

10.8 Sequence of operations for TARV MICE

The sequence of operations for *TARV* MICE is therefore as follows.

10.8.1 MICE service element (MICE SE1): Define MICE zone

Define MICE (4.38) zone and its *access* (4.1) conditions.

10.8.2 MICE service element (MICE SE2): Publish regulation

Make MICE (4.38) zone and its *access* (4.1) conditions and regulation information available to *ASP*s (4.7) and *users* (4.53).

10.8.3 MICE service element (MICE SE3): Detect approaching regulated vehicle

By unspecified means, the approaching point of entry by a *regulated vehicle* (4.43) into MICE (4.38) zone is detected and the *ASP* (4.7) advised.

10.8.4 MICE service element (MICE SE4): 'Interrogated' request for vehicle data

10.8.4.1 An interrogating ITS-station shall request specific data as determined in ISO 15638-6, 7.1 and 8.1.2.

10.8.4.2 In the event that the IVS of a vehicle receives a wireless interrogation requesting the vehicle data, the interrogator shall also provide at the time of the request, a unique 8 byte reference number (`URef`), and a destination IPv6 address (`ReqDest`) where it requests the data to be sent.

10.8.4.3 On receipt of the request the IVS shall acknowledge the request with the appropriate `ACK`nowledgement defined in ISO 15638-6, 8.3.5 <P>, which acknowledges that a request for MICE data has been received.

10.8.4.4 The IVS shall then close the communication session.

10.8.4.5 The IVS shall then open a new communication session using an available and appropriate CALM wireless medium.

10.8.4.6 The IVS shall then send the data file (as defined above in 10.1.1,10.1.4, 10.11 and/or 10.2.1) to a predetermined destination IPv6 (internet) address that has previously been stored in the memory of the data pantry by its ASP, together with the `URef` and `ReqDest` provided by the interrogator.

10.8.4.7 On successful receipt of the data, the recipient at the predetermined destination IPv6 address shall send an acknowledgement <`MPX`> to the IVS.

10.8.4.8 On receipt of the acknowledgement <`MPX`>, the IVS shall close its communication session.

10.8.4.9 The ASP shall be responsible to verify that the interrogation is legitimate, appropriate and from an accepted source, and having verified this, shall be responsible to send the data to the interrogator requested IPv6 address. The means and detail of how this is achieved is outside the scope of this part of ISO 15638.

10.8.5 MICE service element (MICE SE5): ASP notifies jurisdiction or its agents of approaching vehicle

The *ASP* (4.7) notifies the *jurisdiction* (4.34) or its agents with relevant vehicle details and agrees to the payment of any relevant penalties and levies.

10.8.6 MICE service element (MICE SE6): Grant/deny access

Where *access control* (4.2) measures are in place, the *jurisdiction* (4.34) or its agents/MICE (4.38) zone manager decide whether to permit *access* (4.1) and inform the *driver* (4.23), *ASP* (4.7) and *operator* (4.39), if *access* is denied.

The *jurisdiction* (4.34) or its agents/MICE (4.38) zone manager otherwise, permit and enable entry of the *regulated vehicle* (4.43) to the MICE zone (by lifting or lowering barriers, using control lights, or whatever means are appropriate).

10.8.7 MICE service element (MICE SE7): Periodic or requested updates

During the passage through the MICE zone, or at the point of exit from the MICE zone, the *jurisdiction* (4.34) or its agents/MICE (4.38) zone manager may similarly operate multiple *access control* (4.2) mechanisms (by lifting or lowering barriers, using control lights, or whatever means are appropriate). Whenever it receives such a request from an *ITS-station* (4.32) of the *jurisdiction* or its agents, the *IVS* (4.30) of the *regulated vehicle* (4.43) shall update its *basic vehicle data* (4.14) and then send a revised MICED to the predetermined IPv6 address provided by the *ASP* (4.7). The *ASP* updates the *jurisdiction* or its agents with the requested revised MICED.

The *jurisdiction* (4.34) or its agent decides whether to permit continued progress through the MICE zone and informs the *driver* (4.23), *ASP* (4.7) and *operator* (4.39) if continued *access* (4.1) is denied. In these circumstances, it shall be the *jurisdiction* or its agent's responsibility to instruct the *driver* what to do, and the *jurisdiction* or its agents shall also bear the responsibility to keep the *ASP* informed. The means by which the *jurisdiction* or its agents performs these tasks is not specified in this part of ISO 15638.

The *jurisdiction* (4.34) or its agent/MICE (4.38) zone manager otherwise permits and enables progress of the *regulated vehicle* (4.43) through the MICE zone (by lifting or lowering barriers, using control lights, or whatever means are appropriate).

10.8.8 MICE service element (MICE SE8): Vehicle egress

The *regulated vehicle* (4.43) leaves the MICE zone.

10.9 Generic TARV MICE data naming content and quality

The process to obtain *basic vehicle data* [4.14; *TARV LDT* (4.36)] data content shall be as defined in 10.4.2 and 10.4.4.1 and ISO 15638-5.

10.10 Specific TARV MICE data naming content and quality

The format of MICE *Mass* (4.37) specific data naming, content and quality shall be as specified in ISO 15638-12.

The format of MICE zone specific data naming, content and quality shall be as specified in ISO 15638-14.

In the event that data are sent in response to an interrogation requesting MICE data, the following data shall be appended.

Number	Data concept name	Use	Format	Notes/Source
MICE002	URef	Mandatory	AN (8)	An 8 byte reference provided by the interrogator requesting the data. The alphanumeric or binary content of which is unspecified by ISO 15638, but is intended to be used by the interrogator to provide a unique reference to its request for data
MICE003	ReqDest	Mandatory	35 Bytes	Requested Destination IPv6 address for the data to be sent as: scheme://domain:port/path?query_string#fragment_id i.e.: The scheme name (commonly called protocol), followed by://then, depending on scheme, a domain name (alternatively, IP address): a port number, and/the path of the resource to be fetched or the program to be run. If the scheme name is http, the 'http://' is assumed e.g: www.example.com/path/to/name https://example.com/47.35868 telnet://192.0.2.16:80/

10.11 TARV MICE application service specific provisions for quality of service

The integrity of the data are important, and other sensors as well as parameters may then be required based on the approaches and techniques used to provide assurance of the data's quality. The generic quality of service provisions, as specified in 10.4 are defined in 8.2 and 9.5 and ISO 15638-5.

Application specific requirements for the *mass* (4.37) monitoring aspects shall be as specified in ISO 15638-12.

Any further additional data required by the *jurisdiction* (4.34) shall be part of the regulation of the *jurisdiction* or its agents for the MICE zone. However, in defining such requirements, *jurisdictions* shall wherever possible, use performance based or functionally *specifications* (4.50) in order to avoid locking requirements into technologies that will become obsolete.

NOTE Having prescribed integrity and its parameters into an operational system, it is harder to move to other integrity indicators when new technologies come along.

10.12 TARV MICE application service specific provisions for test requirements

There are no specific provisions for test requirements specified in this version of this Standards deliverable.

10.13 TARV MICE application specific rules for the approval of IVSs and 'Service Providers'

See 9.12.

11 Declaration of patents and intellectual property

This part of ISO 15638 contains no known patents or intellectual property other than that which is implicit in the media standards referenced herein and in ISO 15638-2. While the *CALM* standards themselves are free of patents and intellectual property, *CALM* in many cases relies on the use of public networks and IPR exists in many of the public network media standards. The reader is referred to those standards for the implication of any patents and intellectual property.

Application services (4.6) specified within this part of ISO 15638 and ISO 15638-7 contain no direct patents nor intellectual property other than the copyright of ISO. However, national, regional or local instantiations of any the applications services defined in this part of ISO 15638 and ISO 15638-7, or of the generic vehicle information defined in ISO 15638-5, the security requirements contained in

ISO 15638-4, or the requirements of ISO 15638-3, may have additional requirements which may have patent or intellectual property implications. The reader is referred to the regulation regime of the *jurisdiction* (4.34) and its regulations for instantiation in this respect.

Annex A
(informative)

ASN.1 Modules for ISO 15638-13 data concepts

A.1 Use of ASN.1

ISO/TC 204 requires that data concepts defined in ISO/TC 204 ITS standards deliverables are elaborated in ASN.1 (ISO 14813-6).

These International Standards require conformance to ISO 8824-1, ISO 8824-2, ISO 8824-3, ISO 8824-4 and ISO 8825-2.

ISO 21217 and its associated standards require the exchange of data using ASN.1 PER or UPER.

The following example provides a definition for the data concepts used in this part of ISO 15638.

A.2 ASN.1 modules for ISO 15638-13 (*Mass* information for control and enforcement)

A.2.1 Data concepts defined in ISO 15638-5 and used in ISO 15638-13 (MICE)

```
TARVLocalDataTree DEFINITIONS AUTOMATIC TAGS  ::=
   BEGIN
        LDTData:: = SEQUENCE
        {dataFormatVersion      DataFormatVersion,
         messageID              MessageIdentifier,
         primeSPID              PrimeServiceProviderIdentifier,
         applicationSPAddress   ApplicationServiceProviderAddress,
         sessionControlData     SessionControlData OPTIONAL,
         vehicleUniqueID        VehicleUniqueIdentifier OPTIONAL,
         vehicleClassID         VehicleClassIdentification OPTIONAL,
         vin                    VIN,
         propulsionStorageType  PropulsionStorageType,
         time                   TimeAndTimestamp DEFAULT 0,
         location               Location,
         direction              DirectionOfTravel,
         ignition               Ignition,
         movementSensors        OtherMovementSensors,
         driverID               DriverIdentification,
         trailerID              TrailerIdentification OPTIONAL,
         loadData               LoadData
         }

        DataFormatVersion  :: = VisibleString (SIZE (6))

        MessageIdentifier  :: = INTEGER

       PrimeServiceProviderIdentifier  :: = VisibleString (PATTERN "\w#4:\w#4:\w#4:\w#4:\
w#4:\w#4:\w#4:\w#4")  --IPv6 address in the format xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

        ApplicationServiceProviderAddress  :: = CHOICE {
        content   [0] INTEGER (128..16511),--contained in two octets
        extension [1] OCTET STRING(SIZE (2))
 }

        SessionControlData  :: = VisibleString

        VehicleUniqueIdentifier  :: = SEQUENCE {
        countryCode       VisibleString,
```

```
        alphabetIndicator VisibleString,
        licPlateNumber    NumericString
 }

        VehicleClassIdentification  :: = NumericString (SIZE (2))

        VIN:: = VisibleString (SIZE (17))

        PropulsionStorageType  :: = BIT STRING {
        gasoline (0),
        diesel   (1),
        cng      (2),
        lpg      (3),
        electric (4),
        hydrogen (5)
        } --Enter type value with curly bracket at beginning and end, assignment type will
accept word and binary forms of storage type

        TimeAndTimestamp  :: = INTEGER

        Location  :: = SEQUENCE {
                              latitude  VisibleString (SIZE (10)),
                              longitude VisibleString (SIZE (10)),
                              altitude  VisibleString (SIZE (4..5)) DEFAULT "0000",
                              noOfSats  VisibleString (PATTERN "Sat\d+"), --Type value
must be in the format "SatN", where N = the number of satellites present
                              trust     INTEGER {
                                                false (0),
                                                true  (1)
                                                } (0 | 1) --accepts true, false, 0 or 1
                            }

        DirectionOfTravel  :: = INTEGER (0..358) --degrees clockwise

        Ignition:: = VisibleString ("Ign 1" | "Ign 0" | "Ign d") --where 1 = on, 0 = off,
d = disconnected

        OtherMovementSensors:: = SEQUENCE
        {sensorOne VisibleString (PATTERN "\d+\s\Mvt\s[m,n,d]"|"000") DEFAULT "000", --
Type value must be in the format "[SensorNumber] Mvt [m/n/d]", where m = movement, n = no
movement, d = disconnected
        sensorTwo  VisibleString (PATTERN "\d+\s\Mvt\s[m,n,d]"|"000") DEFAULT "000"
        }

        DriverIdentification:: = SEQUENCE
        {jurisdictionID     VisibleString (PATTERN "\d#6\s\w+\s\w+\s(\w+,)*\s\d#6"),
--Must be in the format "[IssueDate(yymmdd)] [IssuingJurisdiction] [Driver'sName]
[VehicleClasses(comma separated)] [ExpiryDate(yymmdd)]"
        userAuthorisation VisibleString (PATTERN "\d#6\s\w+\s\w+\s(\w+,)*\s\d#6"|"000000")
DEFAULT "000000", --Same format as jurisdictionID
        }

        TrailerIdentification:: = VisibleString

        LoadData:: = VisibleString
 END
```

A.2.2 Data concepts defined in ISO 15638-13 (MICE)

```
--Type definition for 15638-13 module

/*
```

The process to obtain *basic vehicle data* [4.17; *TARV LDT* (4.55)] data content shall be as defined in 10.4.2 and 10.4.4.1 and ISO 15638-5.

```
Imports LDTData
```

The format of MICE *Mass* (4.38) specific data naming, content and quality shall be as specified in ISO 15638-12.

```
Imports VMMData
```

The format of MICE zone specific data naming, content and quality shall be as specified in ISO 15638-14.

```
Imports VACData

*/
MassInformationForControlAndEnforcement DEFINITIONS AUTOMATIC TAGS:: =
   BEGIN
      IMPORTS LDTData FROM TARVLocalDataTree
      VMMData FROM VehicleMassMonitoring
      VACData FROM VehicleAccessControl;


      MICEData:: = SEQUENCE
      {
       mICE001 LDTData,
       mICE002  Uref,
       mICE003  ReqDes,
       mICE004 VMMData,
       mICE005 VACData OPTIONAL
      }

      Uref:: = VisibleString (SIZE (8))

      ReqDes:: = VisibleString (SIZE (35))

   END
```

Annex B
(informative)

Independent testing of the protocols defined in this part of ISO 15638

B.1 Objectives

To test the validity of TARV standards it is necessary to simulate the TARV transactions. These are of two types.

I. Instigation

a) The IVS of a vehicle establishes a new communication using one of (and must be tested for each of) several wireless media defined below.

b) The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address.

c) The vehicle sends the datafile to the predetermined destination IPv6 (internet) address.

d) Recipient address sends acknowledgement.

e) IVS closes the communication on receipt of acknowledgement.

II. Interrogation

a) The IVS of a vehicle receives a wireless interrogation requesting a packet of data.

b) The IVS of a vehicle is switched on but is not connected.

c) The IVS of a vehicle receives a wireless interrogation requesting a packet of data.

d) On receipt it acknowledges the request (ACK).

e) It closes the communication.

f) Opens a new communication session using one of (and must be tested for each of) several wireless media defined below.

g) Sends the data file to a predetermined destination IPv6 (internet) address.

h) Recipient address sends acknowledgement.

i) IVS Closes the communication on receipt of acknowledgement.

These scenarios need to be tested using each of 2G, 3G, WiFi, 5,9GHz (IEEE802,11) using the same data.

A number of different datafiles (of different length) and acknowledgements need to be sent, which differ according to the application service. Each of the sequences defined below need to be tested.

In respect of 'interrogation' scenarios the ability to receive the interrogation on one medium (esp. 5,9 GHz) and to instigate the subsequent message using a different medium needs to be tested.

Preconditions, Assumptions and Simulations

1. The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.).
2. CALM and media choice are assumed, and not s.u.t.
3. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, Mesh WiFi, 5,9GHz (IEEE 802.11p).
4. The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated.
5. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

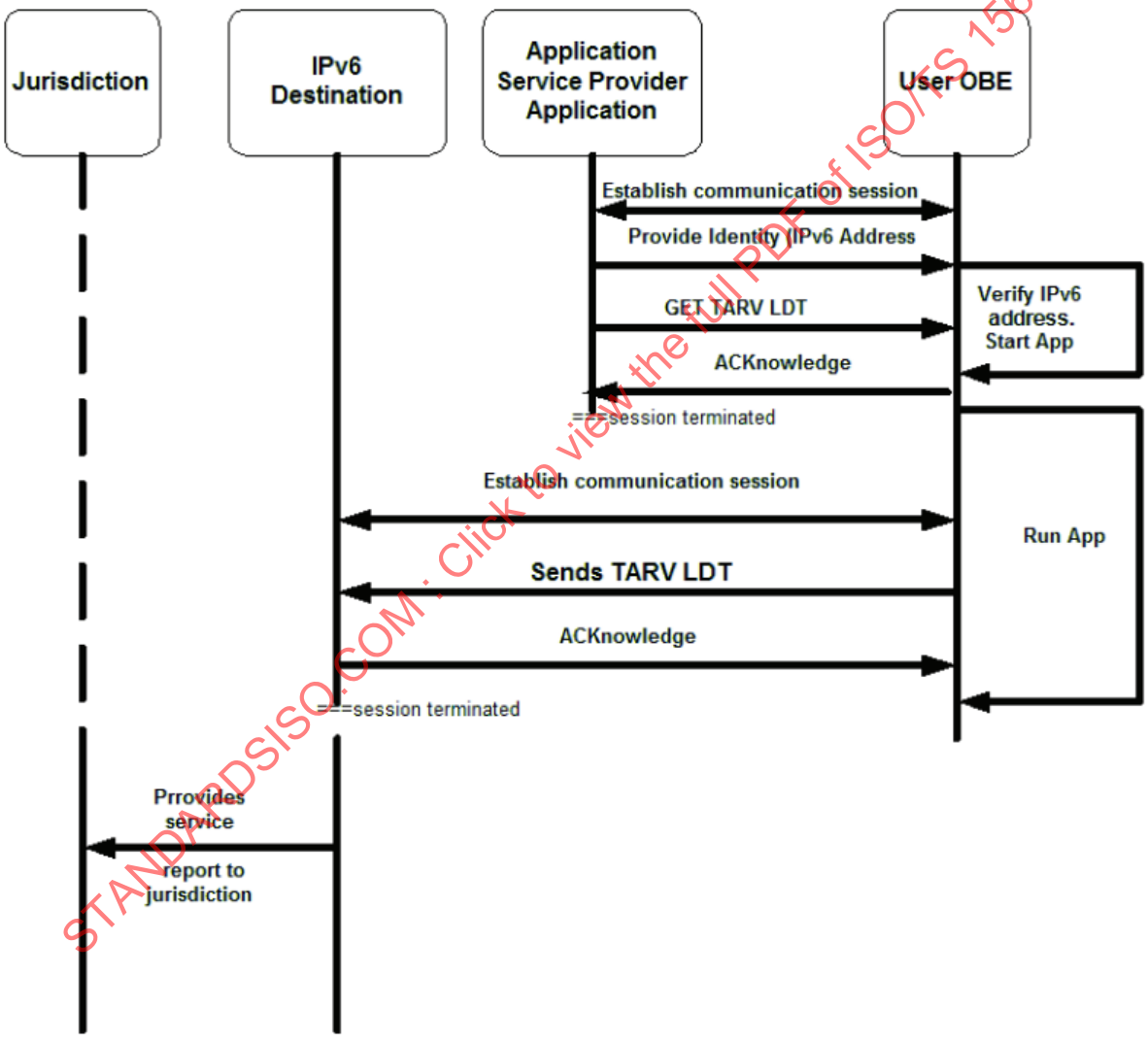

Figure B.1 — Communications sequences to obtain TARV LDT

Application Services where the verity of the communication needs to be physically tested

a) *VAM* *vehicle access monitoring*

b) *RTM* *remote electronic tachograph monitoring*

c) EMS *emergency messaging system*

d) *DWR* *driver work records* (work and rest hours compliance)

e) *VMM* *vehicle mass monitoring*

f) *VMC* *vehicle mass charging* *(no test - data as VMM)*

g) *VAC* *vehicle access control* *(no test - data as VAM)*

h) *VLM* *vehicle location monitoring*

i) *VSM* *vehicle speed monitoring*

j) *CLM* *consignment and location monitoring*

k) *ADR* *Accord Dangereuses par Route (Dangerous Goods) monitoring*

l) *VPF* *vehicle parking facilities*

B.2 Specific TARV MICE data naming content and quality

The tests reproduced below provide these data exchanges as determined in 10.9 and 10.10.

The format of MICE *Mass* (4.38) specific data naming, content and quality shall be as specified in ISO 15638-12.

The format of MICE zone specific data naming, content and quality shall be as specified in ISO 15638-14.

Test Sequences

B.3 Test script 1 LDT Service: VAM vehicle access monitoring (LDT)

CTP 1.1.1 Instigated LDT using 2G

S.U.T. reference	Instigated send of LDT data using 2G
CTP/1.1.1 CTP = Control Test Process	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and must be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the datafile to the predetermined destination IPv6 (internet) address. Recipient address sends acknowledgement IVS closes the communication on receipt of acknowledgement
CTP origin	CSI
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2

Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
1.1.1.1	1	IVS instigates a communication session using selected media (2G) to predetermined destination IP address	Session established
1.1.1.2	2	IVS sends file named	File sent and arrives correctly at destination
		<44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx-:xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x-0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325> <END>	
1.1.1.3	3	Destination address sends ACK <LDX>	
1.1.1.4	4	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.1.1.5	5	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.1.1	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	innovits ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.1.2 Interrogated LDT using 2G

S.U.T. reference	Interrogated send of LDT data using 2G
CTP/1.1.2	

S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected. The IVS of a vehicle receives a 2G wireless interrogation requesting a packet of data. On receipt it acknowledges the request (ACK) It closes the communication. Opens a new communication session using one of (and must be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (internet) address Recipient address sends acknowledgement IVS Closes the communication on receipt of acknowledgement
CTP origin	CEN
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2
Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		**Tester action**	**Pass condition**
1.1.2.1	1	session connected (incoming call)	Call in progress
1.1.2.2	2	Caller sends data request command (GPRS, EDGE etc) GET VAM	Data request sent
1.1.2.3	3	IVS acknowledges request by returning ACKnowledgement <A>	ACK <A> received
1.1.2.4	4	IVS closes communication session	Communication session closed
1.1.2.5	5	IVS instigates a communication session using selected media to predetermined destination IP address	Communication session successfully opened
1.1.2.5	6	IVS sends file named <44EMV0 <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325><END>	File sent and arrives correctly at destination
1.1.2.6	7	Destination address sends ACK <LDX>	
1.1.2.7	8	IVS receives ACK <LDX>	
1.1.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.1.2	**PASS/FAIL**	**Date: 28th June 2102**
Signature/initials		

	**PASS**	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.1.3 Interrogated LDT using 5,9 GHz and responding using 2G or 3G

S.U.T. reference	**Interrogated LDT using 5,9 GHz and send of LDT data using 2G or 3G**
CTP/1.1.3	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected. The IVS of a vehicle receives a 5,9 GHz (IEEE 802.11p) wireless interrogation requesting a packet of data. On receipt it acknowledges the request (ACK) It closes the communication. Opens a new communication session using 2G or 3G. Sends the datafile to a predetermined destination IPv6 (internet) address Recipient address sends acknowledgement IVS Closes the communication on receipt of acknowledgement
CTP origin	CEN
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2
Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		**Tester action**	**Pass condition**
1.1.3.1	1	session connected (incoming call) using 5.9 GHz (IEEE 802.11p)	Call in progress
1.1.3.2	2	Caller sends data request command GET LDT	Data request sent
1.1.3.3	3	IVS acknowledges request by returning ACKnowledgement <A>	ACK<L>received
1.1.3.4	4	IVS closes communication session	Communication session closed
1.1.3.5	5	IVS instigates a communication session using 2G or 3G	Communication session successfully opened
1.1.3.5	6	IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx-:xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x-0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325><END>	File sent and arrives correctly at destination

1.1.3.6	7	Destination address sends ACK <LDX>	
1.1.3.7	8	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.1.3.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.1.3	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	

CTP 1.2.1 Instigated LDT using 3G

S.U.T. reference	Instigated send of LDT data using 3G	
CTP/1.2.1		
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and must be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the datafile to the predetermined destination IPv6 (internet) address. Recipient address sends acknowledgement IVS closes the communication on receipt of acknowledgement.	
CTP origin	CSI	
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2	
Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.	
Stimulus and expected behaviour		
Test point	**Tester action**	**Pass condition**
1.2.1.1	1 IVS instigates a communication session using selected media (3G) to predetermined destination IP address	Session established

1.2.1.2	2	IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx- :xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x- 0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325> <END>	File sent and arrives correctly at destination
1.2.1.3	3	Data request sent	ACK<L>received
1.2.1.4	4	IVS closes communication session	Communication session closed
1.2.1.5	5	IVS instigates a communication session using 2G or 3G	Communication session successfully opened
		IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx- :xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x- 0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325><END>	File sent and arrives correctly at destination
		Destination address sends ACK <LDX>	
		IVS receives ACK <LDX>	File received and ACK <LDX> sent
		IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.2.1	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.2.2 Interrogated at 5,9 GHz and send of LDT using 3G

S.U.T. reference	5,8 GHz Interrogated and send of LDT data using 3G
CTP/1.2.2	

S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected. The IVS of a vehicle receives a wireless interrogation requesting a packet of data. On receipt it acknowledges the request (ACK) It closes the communication Opens a new communication session using one of (and must be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (internet) address Recipient address sends acknowledgement IVS Closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2
Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		**Tester action**	**Pass condition**
1.2.2.1	1	session connected (incoming call) using 5.9 GHz (IEEE 802.11p)	Call in progress
1.2.2.2	2	Caller sends data request command GET LDT	Data request sent
1.2.2.3	3	IVS acknowledges request by returning ACKnowledgement <L>	ACK <L> received
1.2.2.4	4	IVS closes communication session	Communication session closed IVS closes communication session
1.2.2.5	5	IVS instigates a communication session using selected media (2G or 3G) to predetermined destination IP address	Communication session successfully opened
1.2.2.5	6	IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325>	File sent and arrives correctly at destination
1.2.2.6	7	Destination address sends ACK <LDX>	
1.2.2.7	8	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.2.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.2.2	**PASS/FAIL**	**Date: 28th June 2102**

Signature/initials	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.3.1 Instigated LDT using 802.11p (WAVE) 5,9 GHz

S.U.T. reference	**Instigated LDT using 802.11p (WAVE) 5,9 GHz**
CTP/1.3.1	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and must be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the datafile to the predetermined destination IPv6 (internet) address. Recipient address sends acknowledgement IVS closes the communication on receipt of acknowledgement
CTP origin	CSI
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2
Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		**Tester action**	**Pass condition**
1.3.1.1	1	IVS instigates a communication session using selected media (5,9G) to predetermined destination IP address	Session established
1.3.1.2	2	IVS sends file named <44EMV03WRRLDT> <START> < AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx-:xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x-0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325> <END>	File sent and arrives correctly at destination
1.3.1.3	3	Destination address sends ACK <LDX>	
1.3.1.4	4	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.3.1.5	5	IVS closes communication session	Communication session closed

			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.3.1	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.3.2 Interrogated LDT using 802.11p (WAVE) 5,9 GHz

S.U.T. reference	Instigated LDT using 802.11p (WAVE) 5,9 GHz
CTP/1.3.2	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected. The IVS of a vehicle receives a wireless interrogation requesting a packet of data. On receipt it acknowledges the request (ACK) It closes the communication Opens a new communication session using one of (and must be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (internet) address Recipient address sends acknowledgement IVS closes the communication on receipt of acknowledgement
CTP Origin	CEN
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2
Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
1.3.2.1	1	session connected (incoming call) using 5,9 GHz (IEEE 802.11p)	Call in progress
1.3.2.2	2	Caller sends data request command GET LDT	Data request sent
1.3.2.3	3	IVS acknowledges request by returning ACKnowledgement <L>	ACK <L> received

1.3.2.4	4	IVS closes communication session	Communication session closed
1.3.2.5	5	IVS instigates a communication session using 5,9 GHz selected media to predetermined destination IP address	Communication session successfully opened
1.3.2.5	6	IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx-:xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x-0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325><END>	File sent and arrives correctly at destination
1.3.2.6	7	Destination address sends ACK <LDX>	
1.3.2.7	8	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.3.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.3.2	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.4.1 Instigated LDT using Mesh WiFi

S.U.T. reference	Instigated send of LDT data using Mesh WiFi
CTP/1.4.1	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and must be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the datafile to the predetermined destination IPv6 (internet) address. Recipient address sends acknowledgement IVS closes the communication on receipt of acknowledgement
CTP origin	CSI
Reference requirement	ISO 15638-8 and ISO 15638-6, 8.3.4.2

Initial conditions	The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
1.4.1.1	1	IVS instigates a communication session using selected media (Mesh WiFi) to predetermined destination IP address	Session established
1.4.1.2	2	IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx- :xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x- 0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325> <END>	File sent and arrives correctly at destination
1.4.1.3	3	Destination address sends ACK <LDX>	
1.4.1.4	4	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.4.1.5	5	IVS closes communication session	Communication session successfully opened
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.4.1	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	innovits ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 1.4.2 Interrogated LDT using Mesh WiFi

S.U.T. reference	5,9 GHz Interrogated and send of LDT data using Mesh WiFi
CTP/1.4.2	

S.U.T. reference		5,9 GHz Interrogated and send of LDT data using Mesh WiFi	
S.U.T. test objective		The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected. The IVS of a vehicle receives a wireless interrogation requesting a packet of data. On receipt it acknowledges the request (ACK) It closes the communication Opens a new communication session using one of (and must be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (internet) address Recipient address sends acknowledgement IVS Closes the communication on receipt of acknowledgement.	
CTP origin		CEN	
Reference requirement		ISO 15638-8 and ISO 15638-6, 8.3.4.2	
Initial conditions		The s.u.t concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.). CALM and media choice are assumed and not s.u.t. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not s.u.t., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not s.u.t.	
Stimulus and expected behaviour			
Test point		**Tester action**	**Pass condition**
1.4.2.1	1	session connected (incoming call) using 5.9 GHz (IEEE 802.11p)	Call in progress
1.4.2.2	2	Caller sends data request command (GPRS, EDGE etc) GET LDT	Data request sent
1.4.2.3	3	IVS acknowledges request by returning ACKnowledgement <L>	ACK <L> received
1.4.2.4	4	IVS closes communication session	Communication session closed
1.4.2.5	5	IVS instigates a communication session using mesh WiFi selected media to predetermined destination IP address	Communication session successfully opened
1.4.2.5	6	IVS sends file named <44EMV03WRRLDT> <START> <AaaSs0,,0,xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx- :xxxx,128..16511,1G1JF27W8GJ178227,000000,1297339499,0x- 0A5D3770,0x027E2938,0000,Sat8,0,123,Ign 1,000,000,010326 UKPeter Jones,01,02,03a,h1,120325,010326 124538, Peter Jones 01,02,h1120325><END>	File sent and arrives correctly at destination
1.4.2.6	7	Destination address sends ACK <LDX>	
1.4.2.7	8	IVS receives ACK <LDX>	File received and ACK <LDX> sent
1.4.2.8	9	IVS closes communication session	Communication session closed

S.U.T. reference		5,9 GHz Interrogated and send of LDT data using Mesh WiFi	
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

TEST RESULT: CTP 1.4.2	PASS/FAIL	Date: 28th June 2102
Signature/initials 	PASS	innovits ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

B.4 TEST SCRIPT 6 SERVICE: VMM VEHICLE MASS MONITORING

TEST 6.1.1: VMM– via 2G. Instigated

STEP 6.1.1.1: IVS instigates a communication session using 2G media to predetermined destination IP address

AS API IPv6 address

As AS 00000000 00000000 xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

Example: PSP 128..16511 1050:0000:0000:0000:0005:0600:300c:326b

Using ',' as a datafield separator

Table B.1 — Formal data content of a TARV VMM record

FILE TYPE		Format of file name		Notes/Source
VMM	Manda-tory	<VMM><YYMMDD><hhmmss><vehicle registration number> Example VMM 110316 070603 KV76WRR As:<VMM110316 070603KV76WRR>		14.4.7 [Vehicle Mass Monitoring file (VMM file)]
Number	Data concept name	Use	Format	Notes/Source
VMM001	IVS ID	Mandatory		
VMM002	Vehicle location	Mandatory	S (serial number) timestamp location	Calculated as specified in ISO 15638-5, 9.2.4
VMM003	Vehicle load	Mandatory	Form as defined in selected profile of ISO 26682-2	Calculated as specified in ISO 26683-2
VMM004	Mass Data	Mandatory	a) record number;as Numeric,0-999999 b) axle group IDs; as AN(3) c) axle group configuration; as AN(2) d) axle group masses (AGMs);as Numeric (5) e) gross combination mass (GCM).; as numeric (5) f) TARV	See 14.2 above
VMM005	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5 (to indicate end of load data, as this data will vary from journey to journey)

FILENAME:

<<VMM110316 070603KV76WRR>>